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AN INVESTIGATION OF ATTITUDE AS A DETERMINANT OF CONSUMER SPATIAL BEHAVIOUR

by

© SHEILA A. BROWN

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled AN INVESTIGATION OF ATTITUDE AS A DETERMINANT OF CONSUMER SPATIAL BEHAVIOUR, submitted by Sheila Ann Brown in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

Attempts to identify the underlying determinants of consumer spatial behaviour and to explain and predict this behaviour have not been wholly successful. Emphasis on inappropriate explanatory variables was felt to be a major cause of this lack of success. This thesis attempted to contribute to a theory of consumer spatial behaviour by investigating not only the physical facts of the shopping environment but also the motivational significance these had for the consumer. More specifically, the thesis measured consumer attitudes towards two Edmonton shopping centres and examined the relationship between these attitudes and the consumers' visits to these and other shopping centres in the city.

A sample group of consumers was interviewed and their attitudes measured using 44 semantic differential scales. Follow-up telephone calls over a two-month period provided information about shopping visits.

Attitude judgments were structured using factor analysis into four major categories defined by only 29 of the original 44 scales. These categories - congeniality/competitiveness, comfort, reputation/convenience and aesthetic appeal - are those important to consumers in organizing their attitudes towards the characteristics of shopping centres. These four factors were found to accord well with those obtained in similar studies of environmental assessment, although they were fewer in number and more general in nature.

Individual scores on the four factors were calculated to give each individual's attitudinal assessment of the two shopping centres on those scales which had been shown to be important elements of total attitude structure. These scores were used in an attempt to predict shopping behaviour. Interest focussed on which of the two centres was visited most frequently and the actual frequency of visit to these and other centres. A predictive model, based on the factor-defining scales correctly predicted the centre visited most frequently in 65 percent of cases, a figure significantly greater than that expected by chance. Attempts to predict the distribution of patronage, that is the proportion of times a centre would be chosen, were less successful. However, an examination of the relationships between attitude scores and frequency of visits showed noticeable regularities in the proportion of times the preferred centre was chosen.

The findings of the study indicate that attitude is a useful predictor of behaviour and that it could replace traditional explanatory variables in future studies of human spatial behaviour.

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CHAPTER 1

INTRODUCTION

THE GENERAL PROBLEM

The purchase of goods and services by consumers is a major component of human spatial behaviour. Attempts to identify the underlying determinants of consumer behaviour, and to explain and/or predict this behaviour, span a variety of disciplines, including sociology, psychology and geography. These attempts have not been wholly successful, and it has been suggested that a major cause of this lack of success has been an overemphasis on inappropriate explanatory variables. Jonassen (1955) advocated an approach to the study of consumer behaviour that concentrated less on the physical facts of the shopping environment and more on the motivational significance they have for the consumer. A considerable amount of research since 1955 has, nonetheless; largely failed to incorporate motivational variables, concentrating instead on such directly observable or measurable information as distance to a retail facility, its size or the demographic and socio-economic characteristics of the consumer. However, after a number of years of research, there is still no reason to believe that these variables are sufficient to explain and predict shopping behaviour. This fact, along with the failure to link predictive statistics with a behavioural base and an over-emphasis on purely descriptive studies; has confused the issue of what is and is not relevant to a full understanding of the consumer

choice process. Without this information the conceptual framework necessary for the development of a predictive theory of consumer spatial behaviour is lacking.

This study is an attempt to contribute to a theory of consumer spatial behaviour by investigating some of the major factors which influence the consumer's decision to patronize a particular retail facility. A corollary of this is to determine the relative importance of these factors. Types of factors to be considered are suggested by previous research reported in the literature and by a preliminary enquiry conducted in Edmonton prior to the major research undertaking. This pilot study indicated several factors which consumers felt affected their choice of retail outlet. These included convenience and closeness, as well as more specific aspects of the architecture and design of retail centres. Closeness and convenience have long been identified in both the marketing and the geographical literature as important considerations in the consumer decision process. Aspects of the design of retail centres have been emphasized in the planning literature as important to the process of making a centre attractive to consumers. These, and other factors identified in studies reported in the literature, are now discussed.

LITERATURE REVIEW

A consumer's behaviour can be conceptualized as a succession of choices in a series of decision-making situations. A choice is the behaviour of the consumer who, when faced with a number of possible alternative courses of action, acts to carry out one of these courses (Sie-

gel et alia, 1964). Influences on behaviour in repetitive choice situations fall into a number of major categories. These are first, situational variables, which can be directly observed or measured; for example, distance to a facility or its size. Secondly, there are demographic and socio-economic variables, such as the consumer's age and occupation. Lastly, there are psychological variables, such as the consumer's beliefs, perceptions and attitudes, including her perception of situational and socio-economic variables, which cannot be directly observed, although some are amenable to some form of measurement. Much less attention has centred on the psychological category than either of the other two categories. In view of the findings of Jonassen (1955), Isard and Dacey (1962) and Lazer and Wyckham (1969), consumer characteristics and situational variables should be translated into factors of motivational significance so that human spatial behaviour can be better understood. To illustrate the scope of research on the geographic aspects of consumer behaviour, some of the most significant contributions are reviewed below.

Situational Variables

The variables used most frequently in explanations and predictions of consumer behaviour are distance to a retail outlet, and its size. Their use is a legacy from attempts at retail trade area delimitation, which date from Galpin (1915) and from Reilly's (1931) formal work on the laws of retail gravitation, and from the postulates of classical central place theory, as first formulated by Christaller (1966). Reilly recognized that there probably were variables other

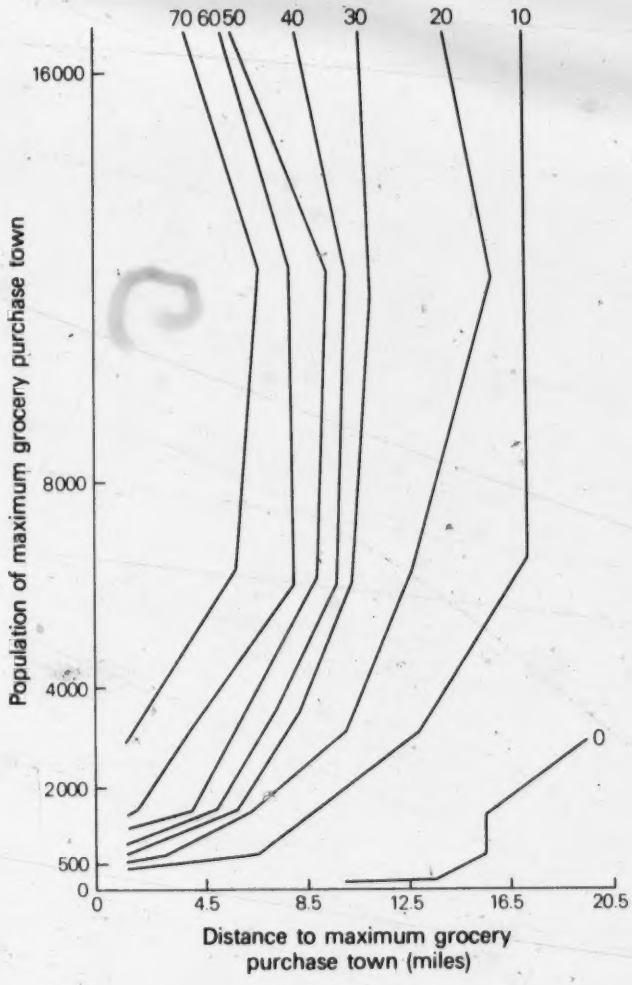
than distance and service centre size which influence the consumer's choice of urban place, but claimed that these were barely worth considering:

> ....the evidence secured in our national study shows that the population of a city and the distance from that city to another comparable city are the primary factors that condition the retail trade influence of that city; that population and distance are reliable indexes of the behavior of other factors; that other factors are either so closely related to, or so directly dependent upon, these two primary factors that the effects of the dependent factors tend to balance out when cities are compared on the basis of population and distance.
>
> Reilly, 1931, pp. 31-32.

Reilly was considering inter-urban shopping choice, however, and there is no reason to assume that his factors are necessarily appropriate in an intra-urban context. Criticism of central place theory also casts doubt on the value of distance as an explanatory variable. The nearest centre postulate, that consumers tend to shop at the centre that offers the desired product closest to their home has been only partially verified. Clark (1968) found for purchases of groceries, meat and vegetables, that 64 percent, 67 percent and 53 percent respectively of the total respondents habitually frequented their nearest outlets for these goods. Evidence from Iowa (Marble and Bowlby, 1968) confirms that many consumers travel farther than necessary from a purely distance minimization standpoint. In addition central place theory makes the assumption of rational, perfectly informed consumers, acting in accordance with the principles of least effort and economic rationality, and this assumption has been strongly criticized (Harvey, 1969). These criticisms have re-

sulted in the actual behaviour process being studied, rather than inferred from the frequency of occurrence of retail centres. Much of this work has examined consumer preferences (Rushton et alia, 1967; Rushton, 1969; Clark and Rushton, 1970), and provides some support for the view that there are numerous retail outlets which are acceptable to the consumer, that is, between which she is indifferent. From such empirical work it has been postulated that consumers chose a centre on the basis of its "attractiveness index," which is defined by a plot of distance against centre size, as shown in Figure 1. It then follows that consumers are indifferent between centres with similar "attractiveness indices." In this case, when the consumer decides to patronize one centre rather than another, that decision must be based on considerations other than distance and centre size alone.

The research outlined above is similar to the work of David Lynch Huff (1960). Huff used shopping centre size, measured by square footage of selling space, and travel time to assess the subjective value of a centre to a consumer. He saw this value as being a function of a host of different factors, but argued that to measure the relative weight of all factors would be an impossible task, and that selection of a few important variables, such as distance and centre size, may be sufficient to predict consumer behaviour. Huff made an empirical test of a probability model based on these two parameters in the Los Angeles area, and obtained some promising results. The study was merely a preliminary to some more extensive research, the results of which have, to date, not



Each indifference curve represents the ratio of the number of actual to potential customers, expressed as a percentage

Source: Rushton *et alia*, 1967

Figure 1

TOWN ATTRACTIVENESS INDIFFERENCE CURVES TO MAXIMUM GROCERY PURCHASE TOWN IN IOWA

been published. In two studies in the cities of Vancouver (Wiginton, 1966) and Edmonton (Dunn and McCune, 1973), the model has not been empirically verified. In addition, models such as Huff's have no explanatory theory and no cause-effect basis. Thus, while they may allow projections of spatial behaviour patterns to be made, and descriptions of spatial patterns of consumer activity to be formulated, they do not provide explanations of the underlying processes which generate these patterns, and thus do not further our understanding of why consumers shop where they do. Huff's study might have been improved by the addition of variables other than distance and centre size. By excluding these variables he achieved limited success in prediction, but none in explanation. Psychological variables which Huff did consider might have been included. He suggested that an individual's shopping behaviour would be influenced by his value system which in turn is influenced by his ethical and moral code, his personality and his mental synthesizing abilities, but did not include these elements in his model. Huff's model also ignores the possibility of two shopping outlets having similar subjective values, based on distance and size,and thus does not consider how a choice is made between the two.

Huff's work is valuable, however, because he recognized that a consumer probably had a cognitive image, that is a mental picture, of a shopping centre, even though he did not incorporate the role of this factor in his model. In addition,he introduced the concept of utility, or subjective value, which provides a useful framework for considering any type of human choice behaviour. Huff proposed that consumers iso-

lated a subset of alternative shopping centre choices from a larger set of possible alternatives, calculated a positive measure of utility for each of the perceived alternatives, and distributed their retail patronage spatially in a probabilistic fashion. He further suggested that consumers do not always choose the most desirable shopping place with all other alternatives having zero probability of being chosen. Rather he suggested that if the utilities associated with a set of centres j_1, j_2, j_3, and j_4 are 1:2:3:4, then the consumer will choose the centre with the highest utility, j_4, 40 percent of the time, since:

$$\frac{4}{(1+2+3+4)} = \frac{2}{5} = 40\%$$

This notion of probability is supported by the findings of a recent study of the attitudes of women towards shopping centres (Owens-Corning Fiberglass Corporation, 1971). It noted that women rarely patronize only one centre, even if they visit their most favoured centre more frequently than any other single centre. The concept of utility seems useful in conceptualizing choice behaviour and is referred to later.

Other situational variables which have been identified include acquisition costs, marketing strategies such as advertizing and such centre characteristics as design, layout and decor. Acquisition costs are the costs which consumers incur in buying goods and services. They include the costs of transportation which vary with distance and mode of travel and the time, effort and energy to search, compare and purchase. The term acquisition cost provides a suitable "umbrella" description of a variety of factors, such as convenience, the walking distances in-

volved, travel cost in money, time and energy and ease of access, all of which have been cited as influences on consumer behaviour (Jonassen, 1955; Voorhees et alia, 1955; Collazzo, 1963).

Advertizing has been suggested as an important influence on consumer behaviour for two main reasons. First, it conveys information on goods and services to the consumer, and second it helps in building the image of the retail facility (Forbes, 1968; Britt, 1960). Unfortunately, little reported empirical work has been carried out to assess the influence of advertizing on consumer behaviour in space. Kleimenhagen et alia (1972) have examined consumer reponse to one form of advertizing, the special promotion, and concluded that there was no tendency for long-term shifts in spatial patronage patterns, and that the promotion merely had the effect of transferring sales from the near future to the present in many cases. Fifty percent of the respondents who purchased goods during the promotion were regular customers at the study centre, who would probably eventually have purchased these goods there anyway. The effect of the promotion was, therefore, to encourage these patrons to purchase, during the promotion, goods which they may not have bought for some time without the promotion. Less than ten percent of the sample were consumers who lived in what was considered the centre's normal trade area, but who generally preferred to shop elsewhere. This supports the view that this type of advertizing, at least, does not result in major long-term shifts in spatial patronage behaviour.

Size, usually measured as square footage of selling area, is one centre characteristic which has already been considered. In addition

there are many store and centre characteristics which consumers have cited as important to them, and which are emphasized in texts on centre planning as being important elements of the consumer's preference structure. Many of the centre characteristics important to consumers were identified in the study carried out as a preliminary to this thesis and these characteristics correspond closely with those cited in the literature. These characteristics may be directly observable features such as layout, decor or architecture, or they may be features such as service and store policies. A summary of the factors which have been identified in this and other empirical studies is given in Table 1.

Demographic and socio-economic variables

A major aim in consumer studies has been to identify common personal characteristics that influence purchase behaviour. Market segmentation studies, for example, are based on the premise that differences among people lead to differences in consumer needs and behaviour. This behaviour has two elements: selective behaviour, which is concerned with choice of product, and patronage behaviour, which is concerned with choice of retail outlet. It is on the former element that most attention in marketing research has been focussed, but it is the latter which is of greatest geographical relevance, and on which attention is now focussed.

The object of consumer patronage studies is to isolate certain spatial patterns in shopping behaviour and to relate them to identifiable consumer characteristics. These include demographic elements, such as age and race, and socio-economic elements, such as income,

TABLE 1: SUMMARY OF SHOPPING CENTRE CHARACTERISTICS IMPORTANT TO CONSUMERS

Layout and architecture	Convenience	Symbols and decor	Sales personnel	Merchandise characteristics	Store policies	Source
			Cooperation Friendliness Interest	Selection Clean & attractive displays Guarantees Price		Britt 1960
Parking facilities Width of walkways Freedom from cars Canopies		Plants	Efficiency Courtesy Politeness	Variety in size & prices Reputation for quality Inventories	Credit Delivery Exchange policy Advertizing	Collazzo 1963
Signs Show windows Landscaping Circulation		Benches		Well-known stores Variety		Douglass 1958
Parking Ease of entry			Friendliness			Forbes 1968
Mall width & height Uniformity in design without regimentation Parking Pedestrian environment Orderly & clean Column spacing Landscaping		Varied colors Varied materials Trees & flowers Sculpture and murals Resting places Lighting Graphics and signs Music		Well-stocked Large stores	Public events	Gruen & Smith 1960

Table 1 cont.

Layout and architecture	Convenience	Symbols and decor	Sales personnel	Merchandise characteristics	Store policies	Source
Parking	Access			Selection		Hoyt 1958b
Parking Ease of movement		Clean Class image Quiet		Quality Price Variety Attractive displays	Delivery Guarantees Exchange policy Hours Credit facilities	Jonassen 1955
	Convenience	Pleasant	Welcoming Courtesy	Variety and selection Inventories Quality Value	Guarantees Exchange policy Credit	Margulis 1972
Parking	Access					Stoll 1967
Parking Landscaping	Access	Variety				Walsh 1967
Mall width Pedestrian flow						
Minimum walking Enclosed malls Easy parking Beauty	Access	Plants Sculpture Sidewalk attractions Benches				Welch 1958
	Convenience			Selection		Voorhees 1955

Table 1 cont.

Layout and architecture	Convenience	Symbols and decor	Sales personnel	Merchandise characteristics	Store policies	Source
Large and spacious mall General layout	Closeness Convenience Accessibility			Prices Variety and selection Quality Specific department store Boutiques and fashion stores	Credit cards Evening hours	Brown 1972a

Compiled from above listed sources.

occupation, education and stage in the family life-cycle. The assumption underlying these types of analysis is that there is a correlation between consumer characteristics and patronage patterns. This assumption seems intuitively plausible, yet it has been questioned by a number of researchers. The ensuing discussion examines some of the attempts which have been made to relate patronage patterns and consumer demographic and socio-economic characteristics.

Income levels have been found to have a considerable influence on consumer expenditures. A number of studies have examined the spatial allocation of expenditures on the basis of income characteristics. Several such studies have examined preferences for different types of stores, such as chain department stores, discount stores and local independents. Samli (1968), for example, examined four different types of stores selling wall-to-wall carpeting, and analyzed the characteristics of customers of each store type. An analysis of the income distribution of the respondents indicated a significant difference in the income of clients of the four stores, with the smallest percentage of customers in the upper income categories patronizing the discount specialty store, and the highest percentage patronizing the high status specialty store. Samli also examined the educational background of the respondents and found that the customers of the discount store had relatively less education than those from other stores, and that the highest level of education prevailed among the customers of the high status specialty store. Occupational characteristics of the customers were also consistent with education and income. The customers of the discount store were more heavily

composed of skilled workers and government employees, compared with the white collar supervisory and professional workers at the high status store.

Similar studies have further investigated the relationship between income, and other demographic and socio-economic variables, and shopping behaviour. Rich (1963) and Rich and Jain (1969) examined the effects of income, residence and life cycle on shopping habits.[1] They found that the attraction for higher priced New York specialty stores lay mainly with women in the upper-middle income and high income brackets, particularly those living in Manhattan. Department stores, however, were used by all income groups, although there was a lower level of patronage by the under $5000 income group. Discount stores, on the other hand, tended to be patronized more by those in middle-income groups. Other variations were found with stage in the life-cycle, and to a lesser extent residence. Older women, for example, and those without children tended to favour department stores more, although this was only found to hold in Cleveland and not New York. Residence was found to have little effect, for example, with reference to discount stores; the proportion of shopping done there varied little with location of the residence in the city. Enis and Cox (1968) examined respondents' patronage patterns in four types of store for three kinds of goods and services,

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[1] Rich defined life-cycle stages as: the bachelor stage, the marriage stage and the solitary survivor stage. Age and number and age of children may be used to give a further breakdown. These stages are important because they affect income level and the composition of the family; important influences on shopping habits.

and related these to three socio-economic characteristics: household income, occupation of the head of the household and family life cycle stage. They concluded that store patronage patterns did vary with these characteristics, but they were unable to indicate either the degree of correlation or the causes of the correlations. Simmons (1964) found an increase in the number of specialty stores in high income areas of Chicago and postulated that people in higher income groups are both more willing and more able to pay for the services of these stores, so that they would be more prevalent in the higher income areas. Forbes (1968) has substantiated this hypothesis for several metropolitan areas in the U.S.A. where a variety of specialty stores were more prevalent in high income areas than in low income areas.

A study by Enis and Gordon (1970) has examined the relationship between store loyalty and socio-economic characteristics. They found that out of seven socio-economic variables, only level of educational attainment and occupation of the head of the household exhibited any relationship with store loyalty, the relationship being inverse in both cases.

It has also been argued that income has an effect on shopping behaviour because lower income groups tend to forge locally-based relationships because of supposed personalization of service. Alexis et alia (1969) hypothesized that customers in lower income classes, that is less than or equal to $5000 per year, are more likely to patronize small neighbourhood stores than consumers in the middle and upper income brackets. The study is significant because not only did it reveal significant

differences in store patronage with income group, but also it confirmed the interrelationship of income, occupation and education. As income levels rise, so do levels of educational attainment and occupational status. There were no major differences in the shopping patterns of high and middle income groups, but a substantially different pattern existed for the low income group. Those in this group did a much greater proportion of food and grocery shopping in independent stores than did people in the other two groups, who tended to patronize major food chains most frequently. Dixon and McLaughlin (1971) found similar evidence that in cities with a large Puerto Rican population, the Puerto Ricans preferred to patronize the more expensive, local Puerto Rican stores than the less expensive chain stores. The concept of personalization of shopping service has been further developed by Stone (1954). He developed a typology of shopping orientations, and compared these with social profiles. He found that those with an economic orientation, who regarded shopping primarily as the buying of goods, were young and socially mobile, often had children and tended to shop at department stores. "Ethical" consumers, that is those who felt a moral obligation to patronize specific types of stores, had a high social status and dealt with independent local merchants because they felt that big business menaced the housewives' way of life and because they preferred not to deal with department store clerks. Apathetic consumers shopped only for convenience, and these tended to be older people. Those who rated stores in terms of the closeness of the relationship between customers and personnel, that is those with a personalizing orientation, did indeed tend to be in

the lower income, education and occupation brackets and further tended to patronize local merchants. Jonassen (1955) also produced evidence that lower income groups are spatially more restricted in their shopping patterns. He suggested that this was in large measure a result of the fact that higher income groups have greater means at their disposal for overcoming the friction of distance, since they have a higher level of car ownership. This has been disputed, however, by Alexis et alia. They present evidence that factors other than physical mobility, or lack of it, are operating to give a higher frequency of visit to local stores by low income families. They took low income as less than $5000 annually, dividing this group into two. One group had an annual income of less than $3000 and the second an annual income of $3-5000. Car ownership was three times as high in group two as in group one but shopping patterns were nearly identical. Clearly, level of car ownership does put restrictions on mobility, but other factors have been found to play a part. Ease of obtaining credit facilities, related to financial constraints, and telephone and delivery service, related to the fact that lower income groups contain proportionately more older people, have the effect of spatially restricting shopping patterns. It has also been suggested that the consumer in the less educated, lower income groups has low purchasing sophistication and prefers to stay close to home where she feels more comfortable (Levy, 1966). This suggests that income or any other explanatory variable alone is insufficient to explain consumer behaviour patterns.

In many studies it has been shown that several of these variables

are interrelated. Together they go to make up what might be termed social class, and this concept has been widely employed to explain variations in consumer behaviour. It came into use in marketing research in the late 1940s, when a number of sociologists entered the field of commercial research. The majority of interest in the topic has been generated since the late 50s, however, when the work of Martineau (1958) was published. The application of the social class concept in marketing stems, as does the use of individual variables such as income, from the fact that consumers within one social class have similar desires and thus form a market segment which is likely to exhibit an homogeneity of behaviour. The problems with the use of this concept are to define the meaning of the term and to measure it. It has been argued that social class should exclude such economic factors as income, and treat them as separate variables. Social class is then a combination of such proxy variables as education and occupation, grouped together into a single index (Warner et alia, 1949; Hollingshead, 1965).

Martineau suggested that although most individuals have no idea of the formal structure of the class system (this with reference to North America) every individual senses that she is more at home in certain places than others. Thus social status affects how people feel about where they should shop. In a study of department stores and shopping behaviour he found that lower status women feel punished in high status stores, both by the clerks and by other customers. The consumer who is socially mobile gives considerable thought to the external symbols of status and tests that status by shopping in department stores

which are felt to be commensurate with her position; she strives to behave in the correct way to avoid rejection. In a study of furniture and appliance buying he found that middle-class people patronized discount houses for appliances because they felt secure with a brand name, but with furniture, where brand names are frequently not known, they felt more secure with a product from a status store. In a follow-up study he found a close relationship between choice of store and class membership and hypothesized that this was because shoppers would not risk feeling out of place in a store. Britt (1960) also argued that women shop where they feel at home or at least not out of place. He suggests that if the product and the price are satisfactory, friendliness and prestige are more important considerations in store choice. In his words the consumer "caters to her ego." She unconsciously asks questions such as "What is the status of the store? Is it high-class, low-class or what? Does it fit in with the image I have of myself?" Thus, the shopper seeks out the store or groups of stores which seem congruent with the socio-economic image she has of herself. Britt claims that this explains why upper class women avoid bargain basements, while lower class women do not expose themselves to possible humiliation in a quality store, even if they have the means to get there and the money to shop there. This point is also made by Goffman (1959) who notes that individuals exercise modesty and underplay expressions of wealth and rank. Rainwater et alia (1962) also found that working class housewives were more provincial in their shopping habits, disliking strange stores and clerks and preferring shops on streets running through working class neighbourhoods. These findings

suggest that it is the consumer's view of her socio-economic status or her self-perception (Levy, 1966) rather than this variable itself, which is important in her behavioural decisions.

The major criticisms of the use of demographic and socio-economic variables in explanations of shopping patterns are that the studies are in large part descriptive and not explanatory and that they are over-simplified. Apart from the studies of Martineau, Britt and Alexis *et alia* most of the work has done little besides indicate the correlations between the dependent variable (shopping behaviour) and the independent variables (demographic and socio-economic factors). There has generally been no indication of the degree of correlation, nor the factors which caused the correlations. In addition it has frequently been assumed that the particular demographic characteristic under consideration is *the* independent variable. That is, store patronage patterns are assumed to be related to and perhaps caused by differences in only that one characteristic. The evidence for the relationship between demographic and socio-economic characteristics and behaviour is by no means unequivocal. Even if patronage patterns did vary with these characteristics, it is highly likely that a particular pattern is related to, or is a result of, more than one characteristic, although these characteristics may themselves be intercorrelated. Given that the evidence for the influence of demographic and socio-economic variables on consumer patronage patterns is not unequivocal, it seems reasonable to infer that other consumer characteristics may be more important. There remains one set of variables to be considered: psychological variables. Differences in con-

sumers' perceptions of the attributes of a retail outlet may be more important in understanding behaviour patterns than the attributes themselves.

The preceding review throws doubt on the adequacy of either situational or demographic and socio-economic variables as a basis for fully understanding the consumer behaviour process. It has been suggested that situational variables only become relevant when they are translated by the consumer into motivational variables. This translation is a function of the mental processes of the consumer, and it is to these processes through a consideration of psychological variables that the discussion now turns.

Psychological variables

Many texts on consumer behaviour discuss the role of psychological variables in consumer choice (Britt, 1960; Myers and Reynolds, 1967; Arndt, 1968; Bennett and Kassarjian, 1972; Engel et alia, 1973). Models of consumer behaviour have been developed which include psychological variables, for example the Howard-Sheth (1969) model of buyer behaviour. They assume that consumer behaviour is boundedly rational, that is rational within the limitations of the information available to the consumer and her perception and learning of this information. They specify a model in which the consumer receives inputs from both the marketing and social environments and responds by purchasing (output). Intervening between the stimulus inputs and the response outputs are the mental processes of the consumer, which involve her motives, evaluations of alternatives and predispositions to act.

Neither this model, nor the majority of texts noted explicitly emphasize the spatial dimension of consumer behaviour. One of the earliest discussions of the influence of psychological variables on consumer spatial behaviour was Jonassen's (1955) examination of the relationship between shopping habits and attitudes. His was an empirical study of the structure of the image consumers have of shopping centres, and he was able to show that the perception of the relative advantages and disadvantages of downtown and suburban centres in three United States cities influenced the consumers' choice.

The research can be criticized on the grounds that attitudes and behaviour were measured simultaneously, thus introducing the possibility that stated attitudes were brought into line with behaviour to achieve cognitive consistency (Festinger, 1957). Nevertheless, Jonassen showed that when physical conditions are seen through the eyes of the consumer they become meaningful motivational factors, and that the more favourably disposed towards a shopping area the consumer is, the more likely she will be to go there and use it more intensively than she will an alternate facility. He also identified some of the factors important in explaining shoppers' preferences for certain retail areas, and further ascertained that distance itself did not determine shopping satisfaction. The influence of distance was found to be vitiated by such considerations as good service, store policies, merchandise quality, centre cleanliness and quietness and centre hours.

Collazzo (1963) showed that consumers shop where they can maximize their shopping satisfaction and minimize their frustrations. He measured

attitudes towards retail institutions, practices and shopping situations to determine the sources of satisfaction and frustration. He found that consumers tended to try to trade with the most accessible centre first, regardless of whether it was all that they desired. However, if this centre did not provide a certain level of satisfaction it would lose volume to more distant centres, which better satisfied the consumer.

Shopper's attitudes towards shopping centres have also been examined by Murphy (1970). He included measures of attitude in an explanatory model of consumer spatial behaviour, and found that such measures were important explanatory variables, and this provides some further confirmation of Jonassen's and Collazzo's findings.

Margulis (1972) has explored the role of beliefs in evaluating opportunities in the retail environment. He concluded that journey-to-shop distances for furniture, the commodity examined, were a function of the consumer's beliefs about retail practices, inventories and atmosphere. The study was an empirical investigation, limited to one city and one commodity. This, along with Margulis' use of the term belief to describe what in essence appears to be attitude, detracts from the study, but nonetheless it offers further evidence of the role of psychological variables in affecting shopping behaviour. This being the case it seems that attempts to include these variables in analyses of consumer behaviour as additional explanatory variables may prove to be worthwhile.

Work on preferences in fields other than consumer behaviour provides support for the view that psychological variables should be included in analyses of choice behaviour in a consumer context. Peterson (1967)

found that the perceived state of the physical condition of residential neighbourhoods, and the amount of greenery or "closeness to nature" were major determinants of expressed preferences. A further investigation (Peterson and Neumann, 1969) of preferences for recreational sites (beaches) yielded similar results. The respondent's attitudes towards features like degree of crowding and amount of vegetation were found to influence their preferences.

Beliefs, perceptions and attitudes towards stimuli are examples of what Yeates and Garner (1971) have termed content imagery, which is defined as the consumer's subjective evaluation of a stimulus, based on its "internal characteristics." In addition they have coined the term movement imagery to describe that set of psychological responses consumers make towards the relative locations of the centres, and the difficulties of undertaking journeys to them. The way in which the location of a centre, and the journey to visit it, is viewed by the consumer may further discriminate between otherwise comparable alternatives.

There have, therefore, been several attempts to introduce psychological variables into geographic research, and into consumer behaviour research, and the results of these studies support the view that such variables have explanatory power. On the basis of this it seems unjustified to continue to emphasize situational variables at the expense of psychological factors. Before the role of these latter factors has been more fully explored it does not yet seem warranted to follow Harvey's (1969) advice that geographers would do well to ignore attitudes, at least in explanations of spatial pattern. Furthermore, the argument for

the inclusion of psychological variables in geographic models is strengthened by recent trends in psychology.

Predicting behaviour is one of the principal concerns of the psychologists and much research has been devoted to this task, using attitude as the predictive variable. After eighty years of attitude research, however, there is still no conclusive proof that attitude is indeed directly related to behaviour. Failure to predict behaviour on the basis of attitude has led many researchers to question either their measuring instruments or their definition of attitude, and much research effort has been expended on manipulating these two variables, with little improvement in predictive ability. Much of this work is reviewed elsewhere (Tittle and Hill, 1967; Wicker, 1969) and has been summarized by Brown (1972b) and will not be discussed in greater detail here.

Recently some psychologists have questioned the existence of an attitude-behaviour link. They have suggested that attitude may not be the only, or even the most important behavioural determinant, and have advocated the inclusion of situational variables into predictive models (Fishbein, 1967; Wicker, 1969). It would, therefore, appear that the psychologists now find themselves in the opposite situation to the geographers. For many years geographers have used situational variables alone in their explanations of human behaviour, and have only recently seen the potential of psychological variables. Meanwhile psychologists have spent many years manipulating pre-overt behavioural variables, that is the mental processes that influence individual behaviour, with no concern for environmental considerations. The time seems ripe for combining both sets

of variables in a predictive model of human behaviour, which would be applicable to the examination of consumer behaviour, or to any other type of behaviour, with appropriate variables selected for the situation under study. This is not to say that a method combining situational and psychological variables has not been tested, for indeed it has been used by Murphy (1970) in a geographical study. Since this study is of major relevance to this thesis, it is now reviewed in some detail. Murphy examined the role of two situational variables, connectivity of consumers with a transport net linking them with supply locations, that is distance from each potential stimulus, and the socio-economic status of the consumer. Consumers of the two commodities, shopping goods and recreational boating facilities, were questioned. Murphy also included the psychological variable, attitude, as a surrogate for the pre-overt behaviour processes of a consumer who is considering several stimuli. The use of attitude as a surrogate variable is considered justified because a consumer develops routines which eliminate the need for continual re-evaluation of situations. These routines are based on her interpretation of the merits and disadvantages of a particular situation. The use of attitude as a surrogate variable was a crucial aspect of Murphy's work, because it was the means of overcoming the difficulty of measuring pre-overt behavioural variables. A consumer who has developed a positive attitude towards a stimulus location could be expected to be more disposed to interact with that stimulus location than with others, towards which she possessed a neutral or negative attitude. In an empirical test of the model based on the three variables outlined, Murphy found

that attitude did indeed have explanatory power, although all three variables contributed to the explanation of observed consumer spatial behaviour.

Murphy's study is an important step towards the development of a theory of consumer behaviour, although his empirical analysis was limited. Criticism must be made of his measurement of the respondents' attitudes towards a stimulus location while they were engaged in behaviour at that location. This opens the possibility of attitudes being brought into line with behaviour, in order to achieve cognitive consistency (Festinger, 1957). This criticism is one which has plagued the psychologists for many years, and to which the failure of many attempts to predict behaviour from attitude has been attributed. Murphy's sampling method yielded a heterogeneous group of individual units of enquiry. This later required classification with reference to rather arbitrary guidelines into socio-economic groups, and this in some measure standardized one of his situational variables. Nonetheless Murphy's work provides support for the view that psychological as well as situational variables are important in spatial behaviour decisions and suggests that further study of psychological variables is worthwhile.

ATTITUDE AND BEHAVIOUR

While Murphy has shown that attitude does contribute towards an explanation of consumer spatial behaviour, he has not furthered our understanding of what attracts a shopper to a centre. He used the semantic differential (Osgood et alia, 1957) to measure attitudes, with five sets of adjectival scales:

1 bad -- good

2 nice -- awful

3 beautiful -- ugly

4 unpleasant -- pleasant

5 fair -- unfair

These adjectives help little in pinpointing what it is that is attractive to the consumer in a shopping centre. In addition respondents probably had difficulty in distinguishing between scales 2 and 3, and in any case, interpretation of these scales would be extremely difficult. Murphy notes, in fact, that there remains the question of which elements of the environment influenced the creation of the observed attitude evaluations. The recognition of these elements should be an important next step in the development of generalizations that may be incorporated into geographical laws of consumer behaviour. Downs (1970) has done some work on the recognition of the elements of the shopping environment of importance to the consumer. His contribution is reviewed more fully in the discussion of the semantic differential.

The Specific Problem

The specific problem in this thesis is to determine what psychological variables are relevant to a consumer's choice of a place to shop. The preceding literature review has indicated the large number of potential influences on consumer behaviour. It is therefore suggested that if meaningful generalizations are to be made the experimental situ-

ation should be simplified as much as possible to isolate the role of certain variables. A standard way of achieving this simplicity is to hold certain variables constant, in order to reduce the number of potential influences on a respondent's behaviour in a given situation. While an attempt will be made to give comprehensive coverage to the potential influences on the individual's behaviour, those factors whose relevance has been seriously questioned will be omitted.

It is proposed to select a situation where a homogeneous sample group is equidistant from two stimulus locations, which are similar in size and composition. This procedure would hold constant three of the major variables used in previous studies to differentiate human behaviour: distance, centre size and the socio-economic status of the respondents, as defined for this study. Since the empirical evidence that exists suggests that advertizing does not have long-term effects on spatial patronage patterns, it will not be included here as a situational variable.

The choice of appropriate psychological variables is more difficult. Murphy (1970), faced with a similar problem, has suggested that attitude can be used as a surrogate for all pre-overt behavioural variables. While the use of this variable as a surrogate for these other variables is open to question, it can be regarded as a composite of psychological information (Fishbein, 1967; Howard and Sheth, 1969). Attention is not focussed on the formation of attitudes and the influence of perceptions, beliefs and behavioural intentions on this process, but rather on the end-product. Following Fishbein's definition the term attitude is used here to mean a learned predisposition to respond to a

stimulus object in a consistently favourable or unfavourable way. Thus, measurement of attitude can yield a single score which places an individual along a continuum, ranging from favourableness towards the attitude object at one end to unfavourableness towards the object at the other. Operationally, it does not matter whether attitude is affected by beliefs, perceptions and behavioural intentions, since it is used merely as an index of attractiveness.

In using attitude two points should be noted. Firstly, as Fishbein (1967) has pointed out, it seems fairly obvious that the chances of predicting behaviour from attitude are practically nil, unless it is attitude towards the appropriate stimulus which is measured, vis-a-vis the behaviour one seeks to predict. It is attitudes towards a specific stimulus, rather than a general class of stimulus objects which should be measured. Secondly, it is important that the level of controversy associated with the behaviour involved be minimized, in order to avoid concessionary responses (Fendrich, 1967), if attitude is to be of value in behavioural prediction. Certainly, shopping can be considered as a relatively non-controversial activity. Consumers' attitudes towards shopping at particular retail outlets can be measured, and this should make it possible to predict their behaviour with respect to those outlets.

The specific problem can best be formulated in terms of the concept of utility. Utility is not an objective value such as an individual's gains or losses, but rather the value to that individual of what they gain or lose. Siegel et alia (1964) have shown that considerations of utility can lead to useful predictions of choice behaviour, because a person be-

haves as if he were maximizing the expected values of utility. This does not mean that he is able to consider all possible alternatives, calculate the expected utility associated with each, and then adopt the behaviour for which expected utility is maximal. Rather, it means that people behave as if they had employed such a procedure. It is noted here that maximization of expected utility should not be considered as a prescription for rational choice behaviour, in the sense of economic rationality, for the utility being maximized may be the utility of variability (the negative utility of boredom), or the utility of a choice with a non-economic payoff.

A shopping trip can thus be considered as having an associated reward for the individual undertaking it. Yeates and Garner (1971) suggest that the notion of trip utility can best be thought of as the difference between the reward from the trip and the costs incurred in making it. Since the external costs are to be held constant in the present study, those influencing utility will be the costs of time, effort and personal comfort that are related to the characteristics of the centre itself and these are to be measured. A particular shopping trip can be considered worthwhile from the consumer's viewpoint if the rewards from making the trip exceed the costs. Hence, consumers may not be concerned with minimizing trip costs as much as with maximizing utility. It is largely the failure to consider this possibility, and the use of the distance minimization hypothesis alone that has resulted in the weak understanding of shopping patterns, and the lack of empirical verification of theoretical models based on this hypothesis.

Studies of choice behaviour have revealed the importance of analyzing "stable-state" behaviour. That is, in repetitive choice situations, subjects' choices have tended to become relatively stable around an asymptote. It is this relatively stable mode of dealing with the alternatives confronting a subject which is the behaviour of interest. Emphasis is not on learning itself, but rather on the stable-state behaviour which ensues after the consumer has learned about utilities. Behaviour here is defined as the proportionate distribution of choices over alternatives at stable-state (Siegel et alia, 1964). It should be noted that stable-state behaviour in the laboratory sense may never be achieved in the "real world." However, if environmental conditions remain stable in a test situation, and the consumer's experience of the environment is sufficiently well developed to reduce the possibility of major additional information inputs, such stable-state behaviour may be approached.

The following model (Figure 2) identifies the characteristics of an environmental situation and behaviour in it, and forms a framework for an exploration of the consumer behaviour process. The behaviour of interest is that which results after a number (as yet undetermined) of experiences, which result in feedback into the model through learning and reinforcement. This behaviour may be viewed as a set of values: P_1, P_2,.....P_k which represent the distribution of choices at stable-state. Huff (1960) attempted to derive such a set of values. He proposed that the probability π of making a particular choice was a function of utility, where the latter was in turn a function of distance and centre size. What

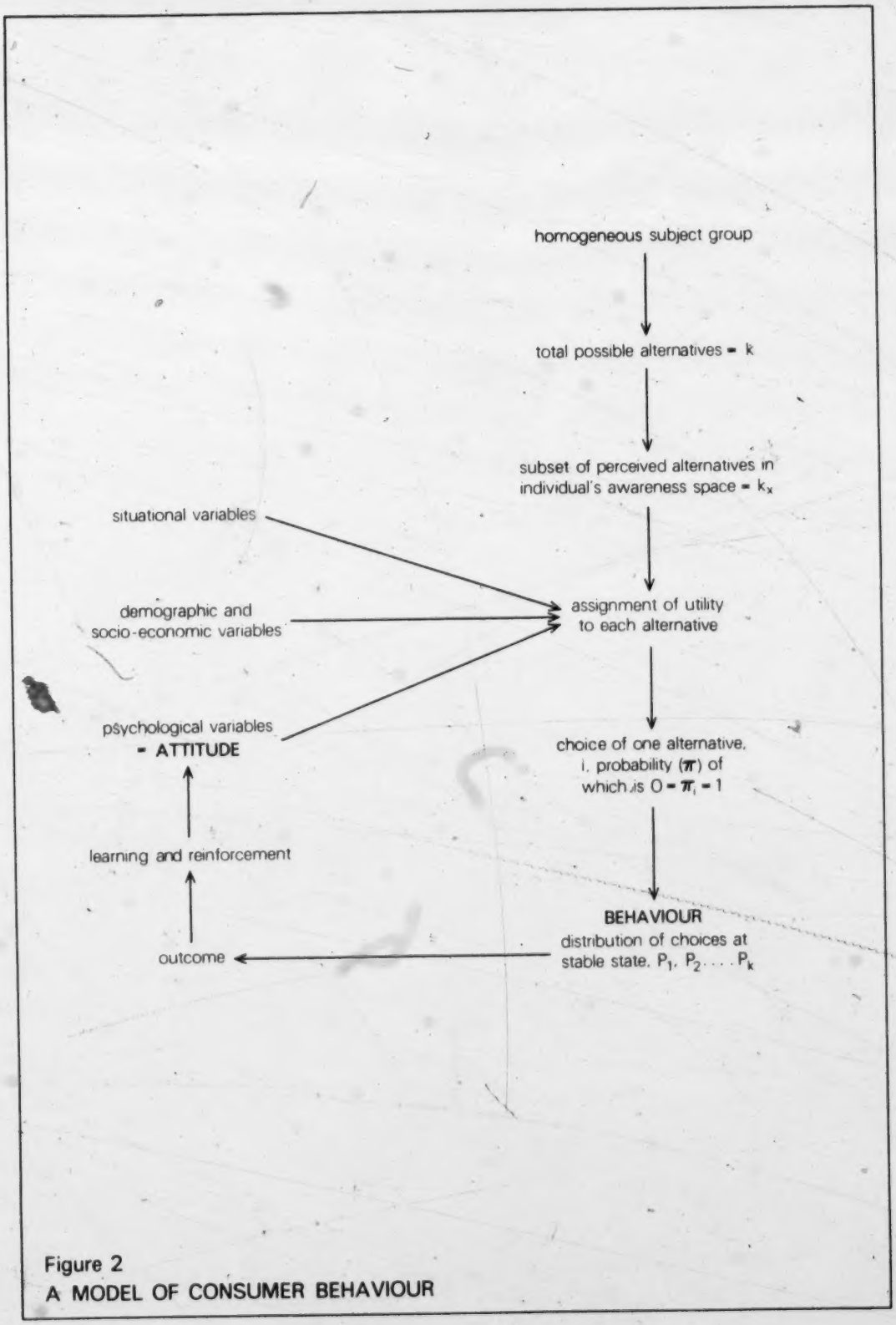

homogeneous subject group
total possible alternatives = k
subset of perceived alternatives in individual's awareness space = k_x
situational variables
demographic and socio-economic variables
psychological variables - ATTITUDE
assignment of utility to each alternative
choice of one alternative, i, probability (π) of which is $0 = \pi_i = 1$
BEHAVIOUR
distribution of choices at stable state, $P_1, P_2 \ldots P_k$
outcome
learning and reinforcement

Figure 2
A MODEL OF CONSUMER BEHAVIOUR

Huff failed to consider, and what has generally been neglected, is the problem of two centres of the same size, equidistant from the consumer. Thus, if the utilities associated with two alternatives i and j are each 4, then there is an equal probability of the consumer selecting either alternative, unless other factors influence her decision. That is, the consumer will choose each alternative 50 percent of the time since:

$$\frac{4}{(4+4)} = \frac{1}{2} = 50\%$$

Huff did not allow for the utility of variability, or for non-material utility, and consideration of these factors might alter the outcome of the decision-making process.

This problem has been discussed by Siegel et alia (1964). They note that special psychological interest may attach to the experimental situation in which the probability of a correct choice is the same for all alternatives. Under this condition they suggest that the effects of differential payoffs could be fruitfully examined, and that the role of the utility of choice variability would be easily discernible. This is a more general statement of the same problem, phrased in the context of an experimental laboratory situation. What is suggested is that greater rewards, whether they are tangible or intangible could influence the choice between equally feasible alternatives, and that the desire for variety, to counteract boredom, could also be important. In this situation it is suggested that the subject would take longer to achieve stable-state behaviour. This is a corollary of the fact that in a laboratory situation, where k=2, the more the probabilities of each event occurring deviate from 0.5, the more quickly stable-state behaviour will be reached.

Brown (1968) has examined the relationship between price perception and store patronage and drawn further attention to the special case of a consumer located equidistantly from various retail outlets. He found that a variety of factors were mentioned as important including convenience, despite the study design which held the distance variable constant.

Hypotheses

From the preceding discussion, and the specific problem outlined, the following hypotheses are set up:

Hypothesis 1. A consumer located midway between two shopping centres of similar size and composition will choose between them on the basis of her attitude towards the two centres.

Hypothesis 2. Such a consumer will distribute her patronage between the two centres in such a way that the probability of her choosing centre A is a function of the utility she attaches to that centre, where utility is a function of her attitude.

SUMMARY

In this chapter the current state of the geography of consumer behaviour has been briefly reviewed, and some theoretical problems have been identified. One such problem can be phrased in terms of the concept of utility, the problem being to determine what factors influence the subjective value of a choice of retail establishment to the consumer. Hypotheses derived from considerations of utility will be tested in an attempt to determine the role of attitude as a factor influencing measures of utility, and the role of utility in consumer choice behaviour.

In Chapter 2 a methodology for testing these hypotheses is proposed. An experimental situation is defined, and methods of data collection and analysis in this situation are outlined. In Chapter 3 the study area and its characteristics are discussed. Chapters 4 and 5 are concerned with data analysis. In Chapter 4 the structure of the attitude judgments is examined. The relationship between attitudes and behaviour is the subject of Chapter 5. The results of these analyses and their implications for a theory of consumer behaviour and for ongoing research in this field are considered. The value of this research to the field of consumer behaviour studies and human behaviour studies in general is considered in a concluding section.

CHAPTER 2

EXPERIMENTAL DESIGN

DEFINING AN EXPERIMENTAL SITUATION

To test the hypotheses presented in the previous chapter an experimental situation must be defined. The city of Edmonton is a suitable urban environment in which to do this. Since the research design requires as many factors as possible to be held constant, centres of the same type should be compared, since it is known from the findings of central place theory that a five store and a fifty store complex are not likely to be direct competitors for more than a few goods. Selection of centres of the same type involves a problem in definition. Shopping centres have traditionally been classified into neighbourhood, community and regional types. Criteria for defining these categories vary considerably. Size (square footage) of centre, trade area population, principal tenant, areal attraction of the centre or a combination of these criteria have variously been used to define types of centre. Gruen and Smith (1960) propose the categories shown in Table 2. The Urban Land Institute, however, has suggested that the principal tenant is the basis for defining the type of centre. Hoyt (1958b) also uses principal tenant as the prime basis of a classification of centres. Regional centres, for instance, are defined as having a major department store of 100,000 or more square feet of store area as the principal tenant, in addition to a total centre area of 250-1,000,000 square feet on a 30-100 acre site.

TABLE 2: TYPES OF SHOPPING CENTRES

Centre type	Trade area population (000's)	Size sq.ft. (000's)	Principal tenant	Occupation of total area	Areal attraction
Regional	150-400	300-1000	Department store	1/3-1/2	10-15 miles
Intermediate (Community)	40-150	100-250	Junior dept. or strong specialty	25-75000 sq.ft.	Local plus extra
Neighbourhood	5-40	30-100	Supermarket	-	Local

Source: Gruen and Smith, 1960

There is, therefore, considerable variation in the definitions of centre type, and any classification must be arbitrary to some degree. Hoyt (1958a) does point out that many large regional centres are of the mall type, first developed at Northgate Shopping Centre in Seattle by John Graham. This aspect of shopping centres provides an additional basis for classification.

There are over 60 planned shopping centres in Edmonton, ranging in size from ones with only three establishments to Londonderry, the largest centre in western Canada, with nearly 100 stores. Eight of these centres have an area of greater than 250,000 square feet, and are also mall type centres. In addition they all have at least one major department store as their principal tenant, which the remaining planned centres do not. A further defining

characteristic is that six of the eight centres have a considerable excess of retail and service establishments (functional units) over number of functions, as Figure 3 shows. The line AB represents a direct linear relationship (45° line) between functions and functional units and while the smaller centres cluster closely around this line there is a group of centres which deviate quite substantially. The characteristics of the eight largest centres are given in Table 3.

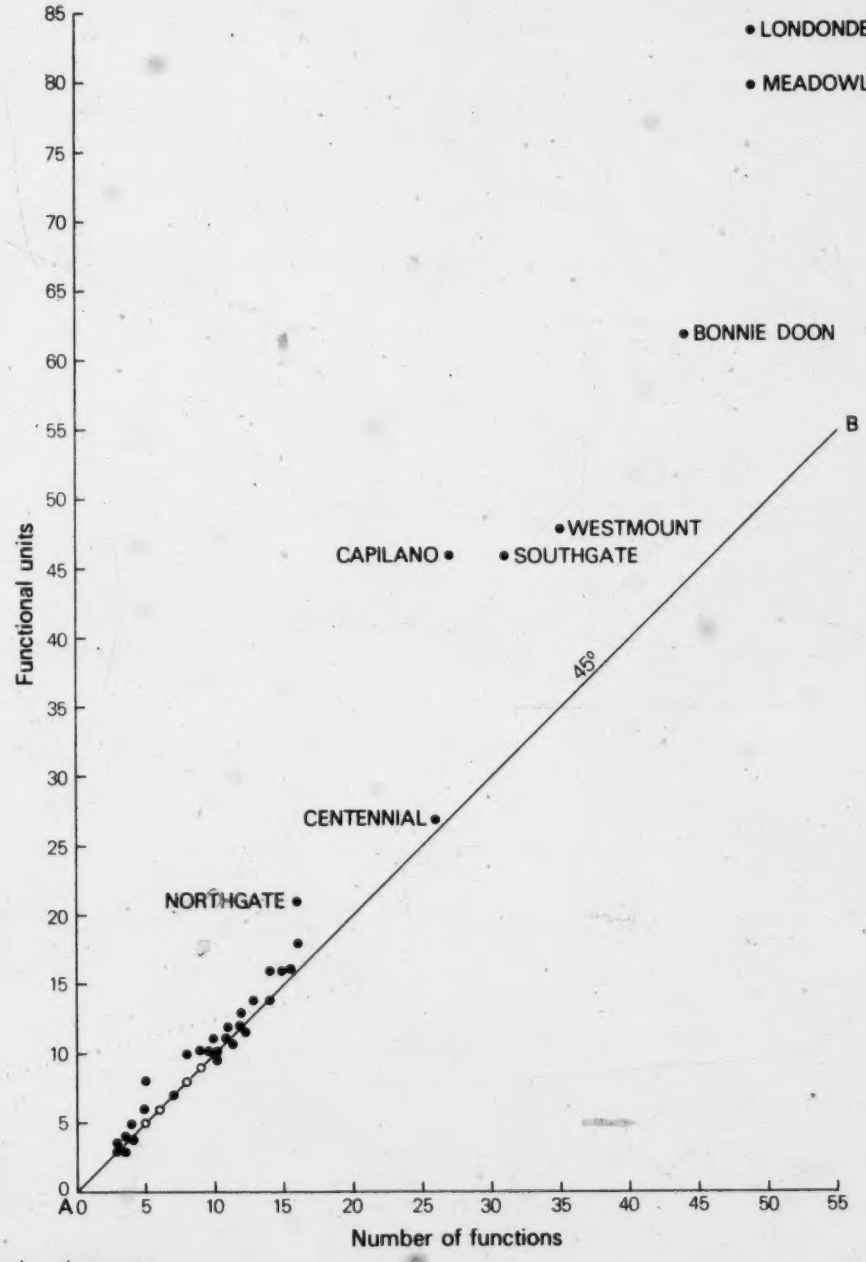
TABLE 3: CHARACTERISTICS OF EDMONTON'S EIGHT LARGEST SHOPPING CENTRES

Centre	Number of establishments	Site acreage	Sq.ft. of building space	Parking spaces
Bonnie Doon	62	33	494,850	2500
Capilano	46	30	370,000	2700
Centennial	27	20.69	282,931	1500
Londonderry	84	42.6	705,831	3604
Meadowlark	80	28	360,000	3000
Northgate	21	25.5	300,000	2000
Southgate	45	40	686,184	3500
Westmount	48	32	420,000	2500

Source: Londonderry-Administrative Office, 1972. All other centres - Shopping Centre Directory, 1971.

It can be argued on the evidence presented that the eight centres listed above form a distinct retail group in the city of Edmonton. Their locations are shown in Figure 4.

Two centres which best meet the specifications of the experiment were selected from this group of eight malls. From Figure 3 several



• One shopping centre
○ Five or more shopping centres

Sources: Cook, 1972; Shopping Centre Directory

Figure 3

THE RELATIONSHIP OF FUNCTIONS TO FUNCTIONAL UNITS IN PLANNED SHOPPING CENTRES IN THE CITY OF EDMONTON

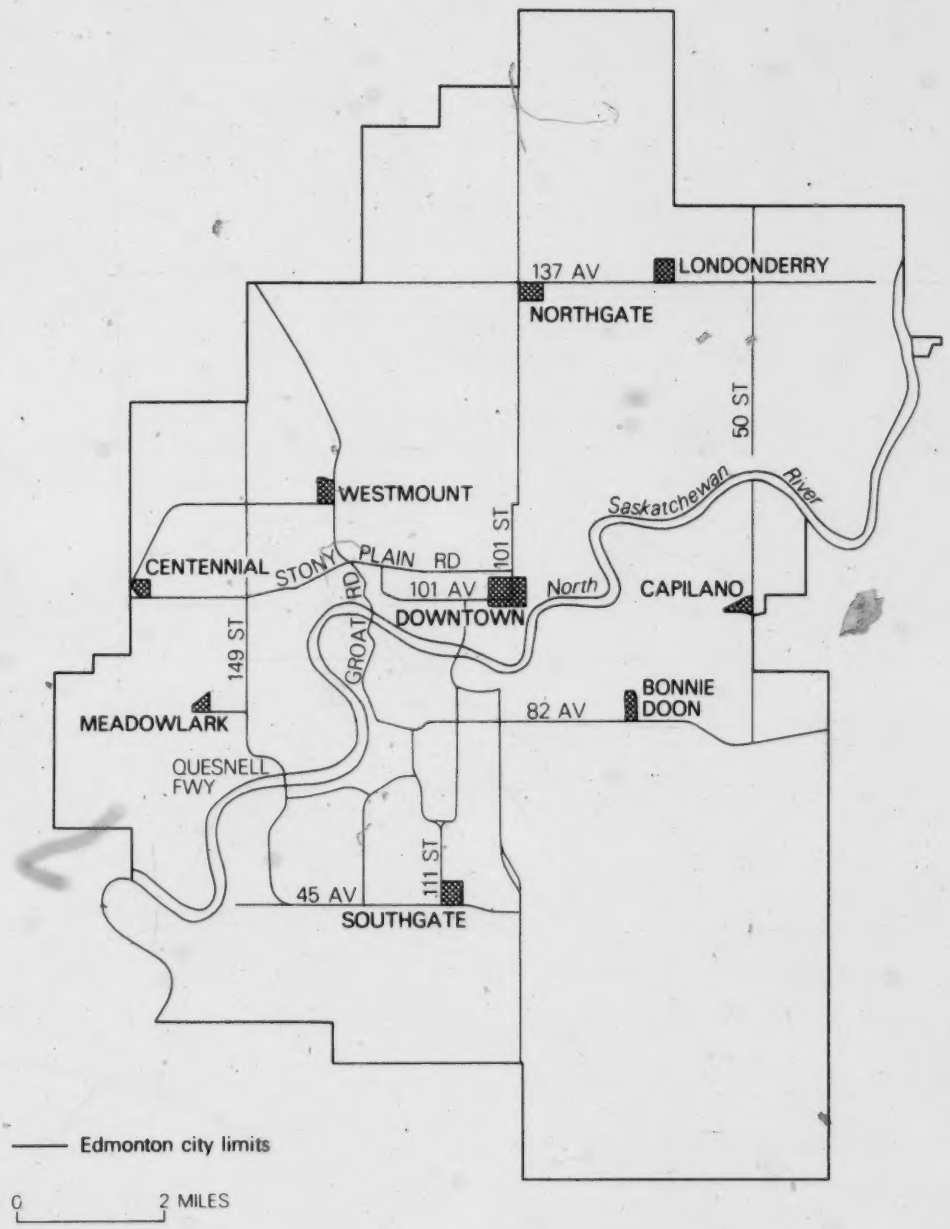


Figure 4
LOCATION OF MAJOR SHOPPING MALLS IN EDMONTON

possible pairs of centres can be identified but reference to Figure 4 shows that only one of these pairs is acceptable. Figure 3 indicates four possible pairs of centres which meet the requirement of similar size. These are Londonderry/Meadowlark, Capilano/Southgate, Capilano/Westmount and Westmount/Southgate. Figure 4, however, shows that Londonderry and Meadowlark are on opposite sides of the city and that there are a number of closer centres for residents located between these two centres. Similarly Capilano is on the other side of the city from both Westmount and Southgate and again there is a problem of intervening opportunities. Westmount and Southgate are both in the western section of the city, however, and a study area located in the vicinity of Groat Road and 82nd Avenue would have easy access to both centres. In addition these two centres are very similar in character. Westmount has 48 stores and Southgate 46 and they are very similar in type as Table 4 shows. The choice of these two centres is not ideal, since Southgate has both a greater site acreage, and hence more parking spaces, and a greater building area. However, the provision of retail facilities is essentially the same as Westmount and this is the principal factor to be held constant. The larger area of Southgate was not considered a major drawback since it is the very fact that the centre is more spacious than an alternative centre with similar retail facilities that is the point at issue in this study.

RESPONDENT SAMPLE DESIGN

An areally stratified sample was defined. Areal stratification permitted the selection of an area which was socio-economically homo-

TABLE 4: RETAIL AND SERVICE ESTABLISHMENTS - WESTMOUNT AND SOUTHGATE

	Westmount	Southgate
Department Stores	Woodward's Johnstone Walker Kresge's Pennington's McArthur's Hollinsworth's Sally Shop Betty Shop Patricia Scott The Boutique Shoppe (Fashion Accessories)	Woodward's Johnstone Walker The Bay Pennington's Sweet Sixteen McArthur's Hollinsworth's Ricki's Dalmy's D'Allaird's Burdine's Niki Boutique Shirley K (Maternity)
Men's wear	Tip-Top Tailors Henry Singer	Tip-Top Tailors Val Berg's The Sweater Shop
Shoes	Agnew Surpass Corona Shoe Renu	Kinney's Vogue Thom McAn
Drugs	Tamblyn	Tamblyn
Jewellers	Birks Westmount watch repair	Birks People's Credit
Photographs	Cantelon	Ross McBain
Cameras	McBain	McBain
Books	Coles	Woodward's Book Store
Banks	Bank of Montreal Toronto-Dominion	Royal Bank
Restaurants	Westmount Kitchen Mall Restaurant	Cara-Zumberger Cockney Kids
Fabrics	Westmount Fabrics Singer Sewing Centre	Silk-o-Lina Martin's Draperies

Table 4 cont.

	Westmount	Southgate
Sound systems and records	Hank Smith's Centre of Music	Kelly DeYong Sound Corp.
Flowers	Margo's Flowerhouse	Shaw's
Cards	The Card House	Coronet Cards
Children's Wear	Jack and Jill	Jack and Jill
Candy	The Nut House	Laura Secord
Food	Bindon's Bakery	Southgate Foods
China and Gifts	-	Reeds
Sporting goods	-	Uncle Ben's
Tobacconists	United Cigar Store	United Cigar Store
Beauty etc.	La Belle Paul-Pierre Westmount Barber	Merle Norman Cosmetics Southgate Barber
Finance and Realty	Household Finance National Trust Weber Bros. Realty	Montreal Trust
Cleaning	Fabric Care Carlton's Cleaning Carousel	Fabric Care
Liquor Stores	A.L.C.B.	A.L.C.B.
Auto. Service	Woodward's	Woodward's
Doctors etc.	1 Chiropractor 1 Optometrist 1 Dentist 2 M.D.s	1 Optometrist

geneous, and located midway between the two centres so that average driving times to each centre were equal. The area selected was Windsor Park and it is discussed more fully in the next chapter. Within this area all houses were visited and those who agreed to the interview formed the primary study population. Since women tend to be the major

purchasers in a family, the female head of the household was interviewed to determine her attitudes towards the two centres, and her frequency of visit to each centre.

Additional restrictions were imposed because learned, stable-state behaviour is the behaviour of interest in predictions of decision-making in repetitive choice situations. It was necessary, therefore, to determine the length of time or the number of shopping experiences which are required for the development of habitual behaviour. Golledge (1967) has examined this problem. He suggested that consumers may be at different stages in the learning process and the failure to consider this is a major reason for the failure of models designed to predict consumer behaviour. From empirical investigations he was able to show that with increasing shopping trials there is a tendency to reduce the number of establishments visited, until such time as an habitual pattern is developed. For one good, groceries, he found that this process took approximately three weeks. This assumes no major additions to the retail system and no major additional inputs of information about the existing system. Bell (1970) in a study of a mobile population examined the number of weeks taken to rebuild shopping patterns. He also found that the process of adjustment was rapid, varying from one week for the selection of a supermarket to nine weeks for choosing a dentist, In most purchase categories "mobiles" tended to lose their "newcomer" identity in as little as three weeks. In the empirical investigation carried out as a preliminary to this thesis the familiarity of respondents with shopping centres was determined. None

of the respondents had lived in the city for less than six months and of these, all but one had visited over half the major malls. Full results are given in Table 5.

TABLE 5: CUMULATIVE PERCENTAGE OF TOTAL SAMPLE VISITING SHOPPING MALLS IN EDMONTON

Percentage visiting all	7* malls	39.3
	6 malls	69.6
	5 malls	93.8
	4 malls	99.8

* Londonderry was not opened at the time of this preliminary study.

Everyone who had lived in the city over two years had visited four or more centres. This indicates little difference in familiarity with these centres between those who had lived in the city six months and those who had lived there for a much longer period. On the basis of the above evidence it seems reasonable to assume that individuals familiarize themselves fairly rapidly with a city's facilities, and, as Golledge has pointed out, this is particularly true of centres closest to their home. Since Southgate and Westmount were the two centres closest to the proposed study area, Windsor Park (see Figure 5), it was reasonable to assume that if respondents were familiar with any of the city's shopping centres, they would be familiar with these two. To maximize the likelihood of habitual behaviour having been developed, only those respondents who had lived at their current residence for at least six months were included in the sample.

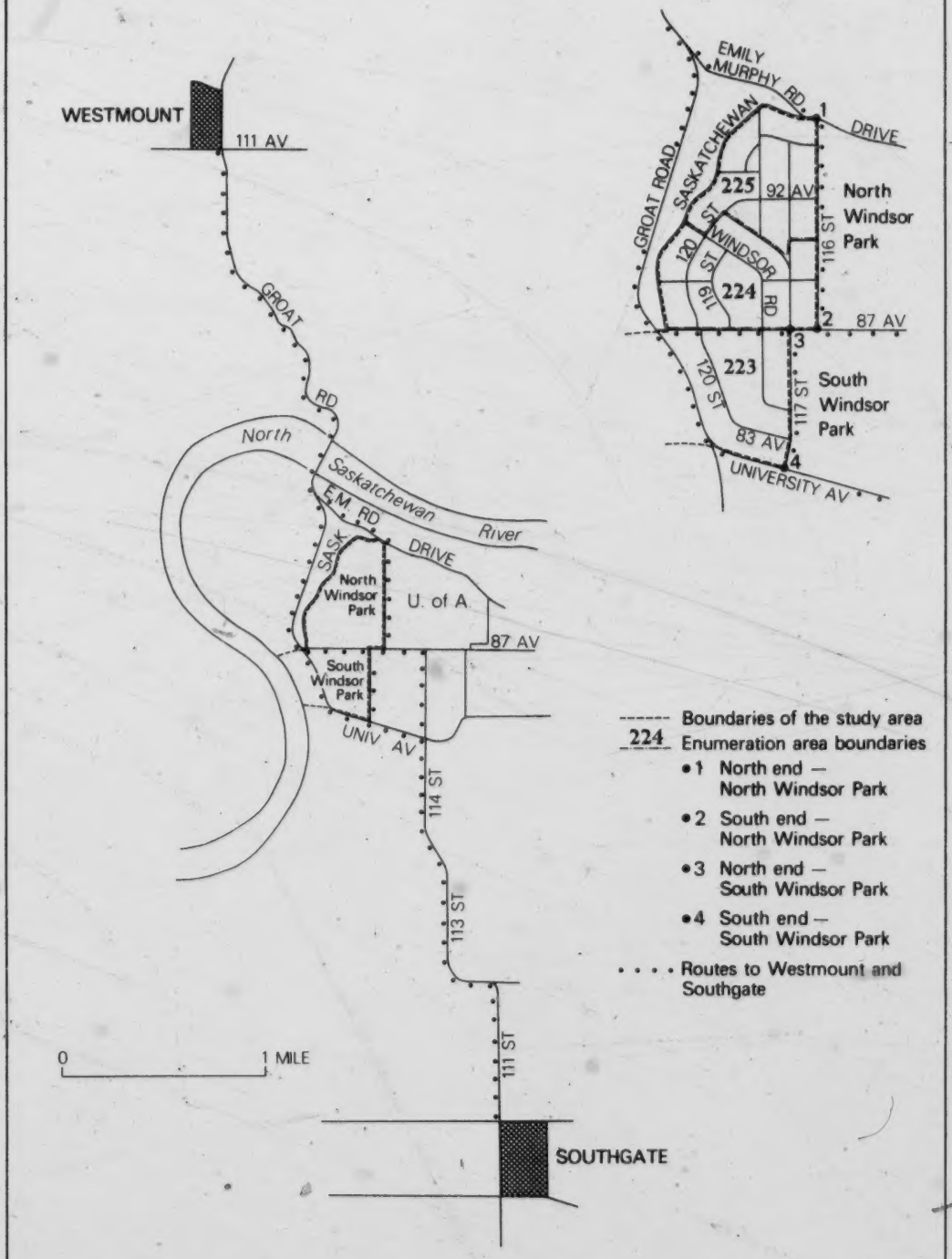


Figure 5
THE STUDY AREA

QUESTIONNAIRE DESIGN

Only a brief questionnaire was needed to determine an individual's length of residence in Windsor Park, her familiarity with the two stimulus locations and to include some "back-up" questions about distance and size perception. Attitude measuring scales were attached to the questionnaire (Appendix A).

The questionnaire was administered to respondents in their homes rather than while they were shopping to avoid attitudes being brought into line with behaviour to achieve cognitive consistency (Festinger, 1957). Since a week had elapsed after the questionnaire was completed before the respondent was contacted again, the likelihood of concessionary responses was considered small.

The questionnaire was followed with a series of eight weekly telephone calls to determine the frequency with which respondents visited the shopping centres. This method required the consent of the respondent to participate in the whole project before she completed the questionnaire. It had the advantage of minimizing inaccuracies due to forgetfulness and was a relatively quick and easy method of contacting respondents again.

Attitude scale construction

The attitude measurement technique used is the semantic differential. This method was developed by Osgood *et alia* (1957) to measure meaning and to index the implications of objects, people and ideas for the human observer. The technique assumes that important cognitive components can be measured by rating concepts according to sets of bi-

polar adjectival scales. Each scale represents a continuum between two adjectives along which responses may be located. A subject's favourable or unfavourable response to the stimulus objects is shown by the scale ratings; a consistently favourable regard for objects implies preference to interact with them.

An appropriate set of adjectival scales must be derived for each research problem. The variety of scales employed in the original work on the semantic differential contained three major dimensions: the evaluative, the potency and the activity dimensions. The scales which produced these dimensions varied for individual subjects, and were not designed to solve geographical problems. Nonetheless, the semantic differential has become popular because it is applicable to studies of public reaction to many types of stimuli and because it corresponds to the verbal mode by which individuals frequently evaluate the environment (Hershberger, 1972). The problem then is to devise a set of scales which are appropriate for measuring attitudes in the present study.

While there are available lists of word opposites most frequently used in psychological tests (Nunnally, 1959) many of the scales are inappropriate in other social sciences. Scale derivation procedures have been developed by those who have used the semantic differential. Downs (1970) derived scales from unstructured conversations with pre-interview respondents and supplemented his list from a dictionary and thesaurus. His scales are shown in Table 6. Studies reported by Seaton and Collins (1972) and by Winkel et alia (1969) derived scales from descriptive literary material. Lundeen (1972) developed a method of triad sorting

TABLE 6: NINE HYPOTHESIZED COGNITIVE CATEGORIES AND THIRTY-SIX SEMANTIC DIFFERENTIAL SCALES

1. Price	
a. competitive	uncompetitive
b. many bargains	few bargains
c. good value for money	poor value for money
d. many price cuts	few price cuts
2. Structure and design	
a. well designed	badly designed
b. simple layout	complicated layout
c. designed with shoppers in mind	not designed with shoppers in mind
d. wide pavements	narrow pavements
3. Ease of internal movement and parking	
a. easy to cross roads	difficult to cross roads
b. easy to park	difficult to park
c. not congested	congested
d. easy to walk around in	difficult to walk around in
4. Visual appearance	
a. well kept stores	badly kept shops
b. tidy	untidy
c. clean	dirty
d. attractive	unattractive
5. Reputation	
a. good reputation	bad reputation
b. generally well known	generally little known
c. generally popular	generally unpopular
d. recommend to friends	wouldn't recommend to friends
6. Range of goods	
a. good choice	poor choice
b. wide range	narrow range
c. well stocked	badly stocked
d. can get it	can't get it

Table 6 cont.

7. Service	
a. helpful	unhelpful
b. friendly service	unfriendly service
c. good service	poor service
d. polite	rude
8. Shopping hours	
a. late closing	early closing
b. convenient opening time	inconvenient opening time
c. good for evening shopping	bad for evening shopping
d. always somewhere open	never anywhere open
9. Atmosphere	
a. busy	not busy
b. relaxed atmosphere	tense atmosphere
c. personal	impersonal
d. friendly atmosphere	unfriendly atmosphere

Source: Downs, 1970

based on Kelly's personal construct theory; subjects were required to give ways in which two items were alike, but different from a third.

These procedures have disadvantages. There is no guarantee that scales derived from the literature are either relevant or comprehensive. Word opposites obtained from a dictionary or thesaurus may not express the correct meaning for the particular stimulus concept. Scales from one study may be inappropriate in another experimental situation. Thus, Downs' scales designed for an English shopping centre may not be directly applicable to one in North America. Lundeen has suggested that only scales produced or corroborated by sample members of the study population permit meaningful rating. His respondents, however, experienced difficulty with his triad sorting procedure be-

cause they had a level of generality which was either too high or too low. Many provided concepts which were too superficial to be related to decision processes, and problems also arose when respondents were not familiar with one or more of the alternatives in the triad. Construct elicitation, an unfamiliar task for many respondents, proved too complex for all but the most articulate and those to whom the facilities which made up the triads were particularly important. Of the seventeen constructs identified, less than half were commonly identified. From these only nine scales could be obtained and by the time that repetition and ambiguity were eliminated, a subjective procedure, the final scales were often unrecognizable as the original personal constructs.

Since the respondents in the triad sorting experiment had difficulty with unfamiliar tasks and with verbal and written cues, a stimulus cue which is within the respondent's experience and which evokes a rapid and accurate response is needed. The photograph is such a stimulus cue. Photographs of the objects or locations to be rated may be shown to the respondents. Although the exact components of photographs which elicit a response are hard to identify, photographs depicting alternative environments do prompt adjectival descriptions which are often phrased as word opposites and reduce the need for further definition (Peterson and Neumann, 1969). As Collins and Seaton (1971) have found, the use of photographs allows easy comparison of stimuli especially in cases where the respondent is unfamiliar with one or more of the alternatives.

A Preliminary Test

A preliminary study was carried out in Edmonton to determine the

value of photographs in eliciting semantic differential scales. Black-and-white photographs of six Edmonton shopping malls were taken within two hours of each other on a Saturday afternoon in March. In all 36 photographs were taken, six of each mall. These photographs were then shown to a respondent who was familiar with all six centres. She selected one photograph for each centre which best showed its characteristics and at the same time gave six shots which were comparable one with another. Each was a shot looking down the centre of the main mall of each centre.

These six photographs were then shown to a sample of twenty Edmonton shoppers who were asked to rank them in order of preference and give reasons why they preferred the centre rated first to the centre rated last. Replies varied from short statements like "More plants, less people" to a twenty minute discourse on the architecture of the malls. Generally replies were pairs of word opposites, for example "This mall is spacious whereas this one is cramped." Word pairs which occurred three or more times were combined to give the following set of scales:

pleasant	- unpleasant	cluttered	- uncluttered
wide	- narrow	open	- constricted
angular	- rounded	noisy	- quiet
clean	- dirty	bright	- dark
ordered	- chaotic	pleasing	- annoying
still	- busy	high	- low
crowded	- uncrowded	spacious	- cramped
high class	- low class	large	- small

From the sixteen scales shown, elements of structure, design, visual appearance, atmosphere and sound are identified. Some elements are specific, for example considerations of height and design appear in what might be termed the structure and design category. Downs generalized such scales into a single scale - well designed. There are similarities between the scales derived here and those used by Downs in the structure and design, ease of internal movement, visual appearance and atmosphere categories, confirming their appropriateness.

A series of bi-polar adjectival scales was thus derived to describe the visual aspects of the shopping environment (see Brown, 1974). Supplementary questioning of the sample group provided scales to describe non-visual aspects of the shopping environment. Some scales corresponded to elements of the shopping environment identified in the literature; several others were identified by the photograph method. The complete set of scales was then presented to a second sample group and scales such as angular-rounded which proved ambiguous or difficult to comprehend without the photographs were eliminated. The final set of scales and the photographs are included in Appendix A. Both the order and the polarity of the scales was randomized for each centre to avoid response patterning.

Having devised a set of attitude measuring scales appropriate to the situation under investigation and selected the two stimulus concepts, the shopping centres of Westmount and Southgate, it was important to convey to the respondents as clearly as possible what was required of them and to set up the scales in such a way that this was facilitated. Nor-

mally, the concept to be judged is written at the top of the page, with the descriptive scales beneath, and each scale is divided into seven. Seven is used because in many different experiments with a large number of different subjects it has been found that all seven alternatives on each scale tend to be used with approximately equal frequency. Stagner and Osgood (1946) experimented with various scale intervals using college students as subjects and found that when more than seven steps were used, the extra discriminatory positions had much lower frequencies. Five steps irritated subjects because they were unable to differentiate the "somewhat" position into "slightly" and "quite a bit." Thus, a scale representing the following seven positions is indicated:

1. extremely positive
2. quite positive
3. slightly positive
4. neutral
5. slightly negative
6. quite negative
7. extremely negative

The actual arrangement of the scales increased the likelihood that check-marks would be put in the correct place, in the spaces and not on the boundaries between different scale positions. Explicit instructions for completing the semantic differential test were also given (see sheet 2, Appendix A).

ANALYSIS OF SEMANTIC DIFFERENTIAL DATA

The raw data obtained from a semantic differential test are a collection of check-marks on the bi-polar scales. For purposes of scoring consistency, the unfavourable poles of the scales may be assigned the value one, while the favourable poles are assigned the

value seven, as shown below:

good 7 : 6 : 5 : 4 : 3 : 2 : 1 bad

There arises the question of defining which of the two poles is the favourable pole. Osgood (1967) has shown that certain words have similar meanings across various cultures. Thus, words like high, white and pleasure tend to be universally good while their opposites tend to be universally bad. There is, therefore, some indication of consistent reactions to some words. It may be necessary to decide which is the favourable pole according to the particular situation in question. Downs (1970) has illustrated this point. He found a negative correlation between congested and busy, since he had assigned the former to the unfavourable pole of the scale, and the latter to the favourable pole. He had assumed that busy would be a favourable characteristic, which it is from an economic point of view, but not from the standpoint of the consumer's comfort.

Having assigned a score to each reply, it is then possible to calculate a respondent's score, or evaluation of the particular concept. Thus, if an individual rates a concept on four scales at positions 4, 5, 6, 5 respectively, he will have a mean score of five, which can be taken as his overall evaluation of the concept. Correlations of scores for each scale with those for all other scales can be used to indicate the internal validity of the scales as measures of the same concept, and also provide the primary input for a factor analysis, which can be used to reduce the scales to a number of basic underlying dimensions which are significant in structuring the consumer's attitude towards the

shopping centres considered. Thus the procedure identifies the aspects of the shopping centres which, under the experimental situation defined, are hypothesized to affect the consumer's behaviour. The semantic differential data is analyzed fully in Chapter 4.

ANALYSIS OF BEHAVIOURAL DATA

Frequency of visit data is related to attitudes in Chapter 5. The functional relationship between attitude scores and frequency of visit is examined. A variety of relationships might be postulated. If the consumer had a more favourable attitude towards one centre than the other, she might adopt the pure strategy of visiting the most favoured centre exclusively. However, the utility of variability might come into play and the consumer might then distribute her patronage between the two centres in a way that reflected her attitudes towards them. Thus, if the relationship between attitude scores and frequency of visit were direct and linear, attitude scores of 5 and 3 for two centres would give probabilities of .625 and .375 respectively of each centre being patronized, since:

$$5+3=8$$

$$\frac{5}{8} = .625$$

$$\frac{3}{8} = .375$$

That is, if a given time period included 10 trips in total to the two centres, then 6 or 7 would be to centre A (P=.625) and 3 or 4 would be to centre B (P=.375). If such a relationship held true, the actual magnitude of the attitude scores would not affect the probabilities. Rather

it is the ratio between the two scores, which indicates the difference between them, that is important. The relationship of attitude (utility) to the probabilities would need to be empirically defined. The determination of such probabilities is dependent on the use of data regarding frequency of visit to the centres under question. If, over a given time period, a consumer visits mall centres with the following frequencies:

Centre A	5
Centre B	3
All other centres	2

then, for the purposes of this study, she has made eight shopping trips during the experiment, and the relationship of her attitude towards these centres and her behaviour can be calculated. Having empirically defined such a relationship it may well be of use in predicting the consumer's patronage of any other centre providing her attitude towards that centre is known.

SUMMARY

From the above discussion it is suggested that the consumer's attitude towards shopping centres is composed of various elements. From the preliminary investigation carried out, and from existing literature it is possible to identify these elements and to devise a set of scales to represent them. Two approaches to setting up the scales are possible. First, an undifferentiated list of scales relating to the reference concept may be presented to the respondent, and factor analysis can then be used to categorize these scales. This was the original procedure used by Osgood et alia (1957) to identify the major dimensions of a

semantic space. In the preliminary investigation for the present study the undifferentiated set of scales shown on page 54 was presented to the respondents. Secondly, categories can be hypothesized as Downs did and factor analysis used to verify or disprove the existence of these categories. This approach has two principal disadvantages. First, it implies preconceived notions of cognitive structure which may be biased, and second, it is restrictive in that the scales used are only those which fit into these preconceived categories. For the present study, therefore, an undifferentiated list of scales will be presented to the respondent, and factor analysis will then be used to identify the major dimensions inherent in this set of scales. The list of scales is shown, with the questionnaire, in Appendix A, and full analytical procedures are outlined in Chapter 4.

CHAPTER 3

THE STUDY AREA

The prerequisites for selection of the study area have been outlined earlier. The area selected forms a well-defined, socio-economically homogeneous unit and is located between Westmount and Southgate shopping centres. These are the nearest malls to the study area and driving time to each of them is approximately equal.

The study area is Windsor Park. Bounded by the North Saskatchewan River to the north and west, by the University of Alberta to the east and by a major throughway, University Avenue, to the south, it forms a well-defined unit comprising three census enumeration areas: 223, 224 and 225 (see Figure 5, page 48).

In 1973 the area had a total of 484 houses, distributed as follows: 163 in E.A. 223; 159 in E.A. 224; and 162 in E.A. 225. In 1961 the area had a total of 1970 people, grouped into 480 households. Comparison of this figure with the 1973 house count suggests a stability of physical structure, with little new construction over the last twelve years if one household per house is assumed. The 1961 data suggest that this is largely the case.

Census data indicate a high degree of homogeneity in social background and present structure. Ninety-one percent of the population speak English as their official language, and this is also the mother tongue for 76 percent of the people. The majority of residents, 83 percent,

are Canadian born and of British descent. Household structure is remarkably consistent, with only one family per household and one household per house in virtually all cases. The average household and family size is four people.

Other primary indicators of social structure are education, occupation and income. A high level of education is indicated among the adult population of the study area. Over 30 percent hold university degrees, and another ten percent had attended university for some period of time. Of those over twenty years of age, 89 percent had been to high school.

Recent occupation data from the 1971 Census is not yet available and so alternative sources of information had to be sought. Occupation structure was derived from Henderson's Edmonton City Directory for 1972, which lists occupants in alphabetical order by address and occupation. Regrettably, because of the form of the directory, only the head of the household and his wife could be included. Working children living at home could not be classified. The results are shown in Table 7. Based on the 1971 Census classification of occupations, 89.85 percent of the working population enumerated in the area in 1972 were in the managerial and professional categories, with the majority of the remainder made up by clerical and sales personnel. This indicates a very high level of socio-economic homogeneity, since, as Oppenheim (1966) has pointed out, a person's occupation tends to be the most important single determinant of his social status, at least in westernized societies, and many researchers have used it alone as an index of social class (see for ex-

TABLE 7: OCCUPATIONAL CLASSIFICATION FOR THE WINDSOR PARK AREA: 1961 AND 1972

Census category	Total 1972	Percent total	Total 1961	Percent total
Managerial, administrative and related occupations	127	34.2	197	29.6
Teaching and related occupations	98	26.5		
Occupations in medicine and health	61	16.5	275	41.3
Technological, social, religious, artistic and related occupations	47	12.6		
Clerical	15	4.0	66	9.9
Sales	18	4.7	39	5.9
Service	3	0.7	45	6.8
Farming, horticulture and animal husbandry	1	0.3	11	1.7
Other primary occupations				
Processing				
Machining & product fabrication, assembling and repairing			17	2.5
Construction trades occupations			3	0.4
Transport and communications equipment operators	2	0.5	13	1.9
Materials handling, other crafts				
Total	372	100	666	100

ample Reiss, 1961). Comparison of the 1972 directory data with the 1961 Census data shows a high proportion of professionals at both times although in 1961 there was a greater proportion of people in the non-professional classes. This difference may, in part, be accounted for by a slight upward shift in socio-economic status. However, it may be only an apparent shift, biased by the failure of the directory to include working children. Nonetheless, the 1961 and 1972 data both show a notable socio-economic homogeneity, with a large proportion of the workforce in the professional classes.

Income data from the 1971 Census confirms the socio-economic homogeneity of the Windsor Park area and also indicates generally high income levels. The data includes both wage and salary earners and self-employed persons. Of the 1080 (out of 1310) people reporting any income, 355 or approximately one third earned over $10,000 per year. Given an average family size of four, there are approximately 327 male household heads in the area and 315 males fell into the over $10,000 a year income category. This implies that at least one member of most households is in the highest Census income classification. Since the available data include children and part-time workers, percentages in each income category are not particularly informative. The high income levels of household heads is sufficient, however, to confirm the high income status of the area.

The available data suggest that Windsor Park is a suitably homogeneous socio-economic unit for study. The second prerequisite for the study area was that it lie between the two shopping centres so that

driving times to these two centres would be approximately equal. To determine whether this was so, a series of tests was conducted to measure average driving times to the centres from Windsor Park. Tests were conducted over a period of three weeks, on each day of the week that the centres were open, that is Monday through Saturday, inclusive. The tests were conducted at different times of day, so that the average time would reflect a variety of driving and traffic conditions. Tests totalled three per day on Monday, Tuesday, Wednesday and Saturday; one in the morning around 10 a.m., one around noon and one in mid-afternoon around 3 p.m. On Thursday and Friday, when both shopping centres stay open until 9 p.m. an extra test was included around 7 p.m. Measurements were taken from several locations which represent the principal access roads into Windsor Park, and a variety of routes were followed. The results of these tests are shown in Table 8.

TABLE 8: AVERAGE DRIVING TIMES FROM WINDSOR PARK TO WESTMOUNT AND SOUTHGATE

	To Westmount	To Southgate
North Windsor Park - north end	5.2 minutes	10.4 minutes
- south end	7.2	8.7
South Windsor Park - north end	7.0	8.6
- south end	7.6	8.0

An examination of the data presented in Table 8 indicates that the greatest difference between the times taken to drive to one centre

rather than another is about five minutes. However, if the area north of 91 Avenue, which corresponds with the boundary between E.A.s 224 and 225, is excluded, the times taken to drive from the study area to either centre are similar. The difference in times is felt to be too small to make any great difference in the choice between the two centres. For the purposes of this study, the part of Windsor Park in E.A.s 224 and 223 may be considered equidistant from Westmount and Southgate.

SUMMARY

An area was selected which met both the prerequisites of the study. Windsor Park was found to be socio-economically homogeneous and two E.A.s within it can be considered equidistant from Westmount and Southgate.

CHAPTER 4

ATTITUDE DATA ANALYSIS

Two sets of data were produced by the study-attitudinal data and behavioural data. Analysis of the results consists, therefore, of two phases: first, structuring the attitudinal data and secondly, relating this structure to behavioural measurements.

In this chapter the main emphasis is the examination of the nature and structure of attitude judgments. The data set obtained from the attitude measurements can be considered as a cube, comprising the scores of each respondent on each scale for each concept. The cube has the dimensions 131 respondents x 44 scales x two centres. In the following discussion the data collection methods are evaluated and the attitudinal measurements examined.

EVALUATION OF RESEARCH METHODS

The Semantic Differential

The semantic differential was found to be an effective attitude measuring device. The instructions for completing the test were clearly spelled out and only six out of 168 subjects were rejected for failure to do the test correctly. Two of these six felt that they were not sufficiently familiar with either Westmount or Southgate to even complete the scales; two completed the scales for one centre only; and the remaining two omitted large numbers of scales. Most respondents understood

what was expected of them and carried out the test quickly and accurately.

The Sample

All houses in Windsor Park were visited and call-backs made at various times of day to prevent systematic bias. This way the respondents who were missed during the day because they were out at work were included in the sample. From a total of 322 residences in the area, 168 interviews were completed. This represents over half of the total. The remaining 154 were missed for three main reasons. First, many people could never be found at home. Secondly, several houses did not have a "female head of the household." Lastly, there were a few refusals to participate, particularly from older residents, for reasons ranging from lack of time or interest to having "participated in the survey the previous year." A sample of over 50 percent of the residences in the area was considered most satisfactory, allowing for slight further reductions in sample size over the remaining two months of data collection.

The final sample was 131 people. Thirty-seven were eliminated from the study after they had completed the interview, for a number of reasons. These reasons are summarized in Table 9. This loss of respondents is small considering the nature and timing of the study. Only seven people felt that participation over two months was a major imposition and refused to cooperate. Since data collection extended into the summer and past the end of the university year, and many people were university employees (see Chapter 3), some loss of respondents who moved or went on vacations was anticipated. This was the major reason for

TABLE 9: REASONS FOR FAILURE TO COMPLETE SURVEY

Incorrect completion of questionnaire	8
Refusal to be telephoned: at all	5
after a few weeks	2
No shopping visits made	4
Impossible to contact at all, or on a regular basis	9
Known to have moved or be vacationing	9
Total	37

elimination, but the numbers involved were small. The final sample is 44 percent of the potential sample, and this is regarded as more than adequate.

ATTITUDE DATA

The raw data obtained from the semantic differential were a collection of check-marks on the bi-polar scales. Each mark was assigned a score according to its scale position, with seven representing the most favourable response and one the least favourable. Since the polarity of the scales had been randomized, they were readjusted for easy scoring. These data were treated in a number of ways to obtain several sets of information. Initially data for each centre were treated separately.

Summated Attitude Scores

An individual's attitude towards each centre is defined as Σx, where x is the score on each scale. This procedure readily accommodates two major properties of attitudes - direction and intensity. Since four

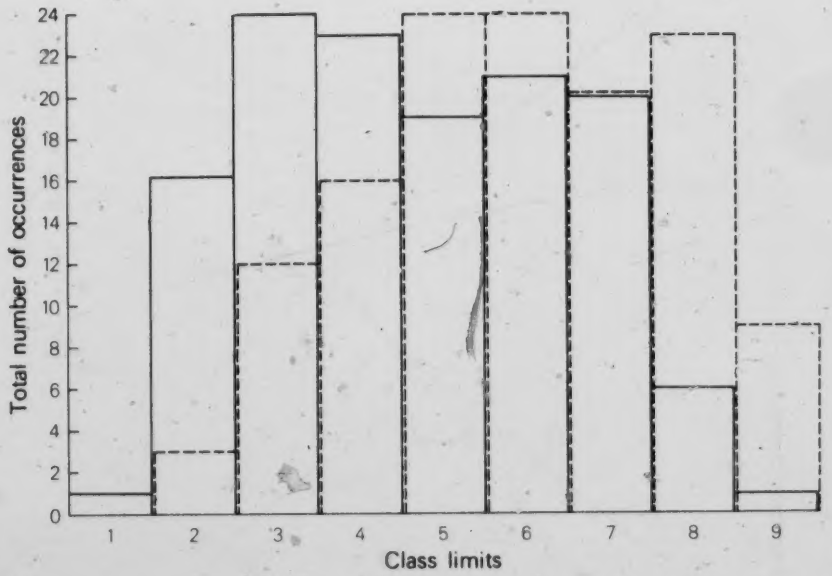
is the neutral position on each scale, scores greater than four indicate a favourable attitude and scores less than four indicate an unfavourable attitude. Intensity is measured by the polarization of the attitude score. On a single scale there are only three levels of intensity - "slightly," "quite" and "extremely" on either side of neutral. By summing scales, however, a greater number of intensity positions are possible. Thus, for a set of 44 scales there is a possible range of scores from 44 for the least favourable through 176 for a neutral attitude to 308 for the most favourable. A neutral rating can be considered one of least intensity (Oppenheim, 1966).

Scale scores were summed for each respondent for each shopping centre. The ratio of Westmount to Southgate scores was also calculated as an indicator of attitudinal preference. The summated scores are summarized in Figure 6.

Mean Attitude Scores

The mean response on each scale and the range of these responses can be calculated. $\frac{\Sigma y}{N}$ gives mean response, where y is the score on each scale and N is the total number of respondents. Dispersion is given by the standard deviation $\sigma = \sqrt{\frac{\Sigma(y-\bar{y})^2}{N}}$

Means and standard deviations for the 44 scales, calculated from 131 responses for each shopping centre are shown in Table 10. These calculations permit the construction of attitude profiles which allow visual comparison of mean attitude scores towards the two centres. Figure 7 is a graphical comparison of scale means for each centre which illustrates overall mean attitudes and the difference between the two



—— Westmount
---- Southgate

Class limits
1 130-149
2 150-169
3 170-189
4 190-209
5 210-229
6 230-249
7 250-269
8 270-289
9 290-308

Figure 6
HISTOGRAM SHOWING THE DISTRIBUTION OF ATTITUDE RESPONSES TO WESTMOUNT AND SOUTHGATE

TABLE 10: MEAN RESPONSES AND STANDARD DEVIATIONS OF SCALE SCORES FOR WESTMOUNT AND SOUTHGATE

Scale Number	Westmount		Southgate	
	$\bar{x}$	σ	$\bar{x}$	σ
1	4.79	1.39	5.34	1.59
2	4.29	1.57	5.53	1.59
3	4.20	1.63	5.21	1.50
4	5.50	1.29	5.34	1.37
5	4.57	1.63	4.98	1.47
6	5.51	1.45	5.80	1.47
7	5.20	1.33	5.38	1.41
8	5.22	1.30	5.27	1.43
9	4.54	1.60	5.37	1.30
10	3.03	1.71	2.71	1.54
11	3.97	1.53	5.64	1.31
12	3.70	1.63	5.15	1.66
13	5.53	1.78	6.23	1.12
14	5.20	1.52	5.18	1.58
15	3.94	1.55	4.69	1.92
16	4.94	1.57	5.64	1.54
17	5.42	1.83	6.04	1.29
18	5.67	1.44	6.10	1.12
19	5.08	1.56	5.82	1.33
20	5.47	1.46	5.56	1.31
21	5.73	1.46	5.93	1.38
22	4.74	1.67	4.99	1.57
23	4.85	1.35	4.97	1.59
24	4.88	1.46	5.42	1.38
25	5.05	1.79	6.04	1.27
26	5.09	1.54	5.54	1.25
27	5.50	1.51	5.66	1.37
28	5.41	1.50	5.79	1.38
29	4.71	1.64	5.64	1.59
30	4.82	1.40	6.04	1.13
31	4.75	1.53	5.53	1.33
32	5.02	1.47	5.40	1.44
33	4.14	1.28	5.04	1.34
34	4.99	1.45	5.89	1.21
35	3.70	1.53	4.01	1.84
36	5.05	1.42	5.85	1.21
37	3.80	1.38	4.39	1.67
38	4.24	1.02	5.15	1.21
39	4.55	1.27	5.81	1.05
40	4.54	1.33	5.85	1.21
41	5.25	1.32	6.15	1.03

Table 10 cont.

Scale Number	Westmount		Southgate	
	$\bar{x}$	σ	$\bar{x}$	σ
42	4.49	1.58	5.81	1.27
43	5.72	1.29	5.66	1.40
44	5.26	1.38	5.24	1.66

centres. Line AB is the neutral point (scale-score of four).

Direction of attitudes

From Figure 7, it is apparent that attitudes towards both centres are generally favourable. Both are unfavourably rated on the scale busy/not busy. This confirms Downs' finding that busyness is an unfavourable centre attribute from the consumer's point of view. This is the only scale on which Southgate is unfavourably rated. Westmount is rated unfavourably on five other scales - wide/narrow, cluttered/uncluttered, congested/uncongested, crowded/uncrowded and quiet/noisy. This suggests that Southgate is viewed as considerably more spacious than Westmount, and that lack of room is Westmount's major failing. Southgate is rated markedly higher on all these scales except crowded/uncrowded, on which it is rated neutrally.

In Figure 7 the line representing mean responses for Southgate is to the right of the line for Westmount, in the direction of the favourable pole. This leads to the conclusion that attitudes are more favourable towards Southgate than Westmount. The two lines converge and diverge showing that on some scales average responses are similar but on others they differ substantially. Twenty-nine scales have a

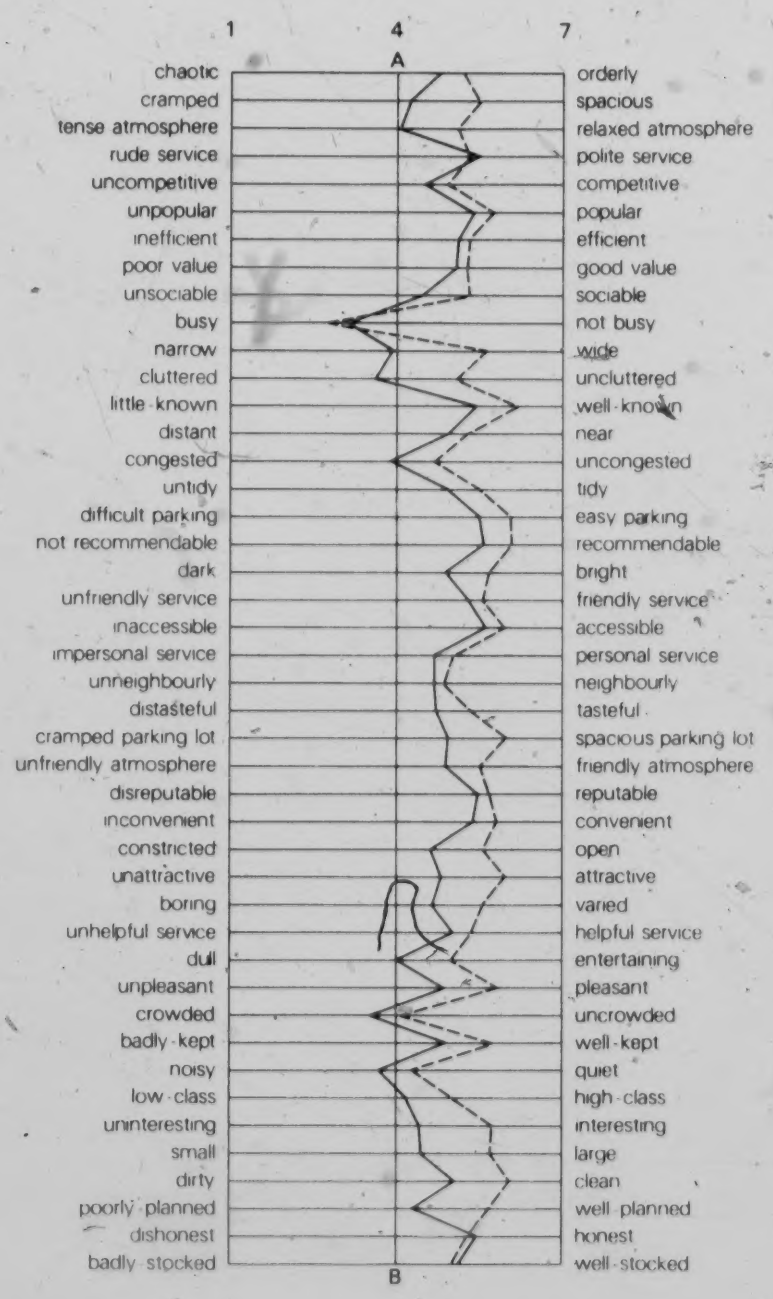


Figure 7
GRAPHICAL COMPARISON OF SCALE SCORE MEANS
FOR WESTMOUNT AND SOUTHGATE

difference between the means for each centre of greater than 0.5. These are listed in Table 11. It is possible that only those scales which

TABLE 11: SEMANTIC DIFFERENTIAL SCALES WITH MARKEDLY DIFFERENT MEANS FOR RESPONSES TO WESTMOUNT AND SOUTHGATE

orderly	recommendable	entertaining
spacious	bright	pleasant
relaxed atmosphere	tasteful	uncrowded
sociable	spacious parking lot	quiet
wide	friendly atmosphere	high class
uncluttered	reputable	interesting
well-known	open	large
uncongested	attractive	clean
tidy	varied	well-planned
easy parking	helpful service	

show differences in mean response are important to the choice process. This proposition is examined in more depth later.

Intensity of attitudes

Mean attitude responses on each scale for Westmount range from 3.03 to 5.72, with the majority falling between 4.5 and 5.5, indicating that Westmount is viewed "quite" favourably. Southgate responses range from 2.71 to 6.15, with the majority greater than 5.0, indicating that attitudes towards Southgate are "quite" to "extremely" favourable. Few scales evoked low intensity ratings (neutral scores), among them entertaining/dull for Westmount and crowded/uncrowded for Southgate. This indicates that the scales used were appropriat descriptors of the concepts, the shopping centres, and that people did have well defined attitudes towards the centres on all but one scale for each centre.

The preceding discussion has described, in general terms, the

direction and intensity of attitude judgments. The main purpose of this chapter is to uncover the structure of these judgments. That is, to determine whether attitude scales fall into a smaller number of groups which are used to organize the image of a shopping centre in the consumer's mind, and whether there are some scales which are redundant in making attitude judgments. The suggestion that some scales may be more important than others in choosing between centres has already been made, and in addition there may be redundancies because of intercorrelation among the original measuring scales. The aim here is to isolate a limited number of general dimensions which have maximum power to differentiate between the centres and therefore to best predict choice behaviour. Before proceeding with the reduction of the data set, however, preliminary analyses were made of the relationship between attitude and behaviour to ensure that more detailed investigation was justified.

PRELIMINARY ANALYSES

Two analyses were carried out; one using all 44 scales and one using only those 29 scales which had been shown to have differences in mean ratings. Scores were summed over these scales for each centre and the ratio of Westmount to Southgate scores was calculated. It was postulated that where the ratio was greater than one, Westmount would be visited more frequently; that where the ratio was less than one, Southgate would be visited more frequently; and that where the ratio was equal to one (defined as the range .99 to 1.01) the centres would be visited with equal frequency (defined as equal numbers of visits, plus or minus one). Using this measure the shopping centre chosen most fre-

quently by each respondent was accurately predicted for 70 percent of cases using all 44 scales and 60 percent of cases using only 29 scales. These findings indicate that attitude scores have predictive ability and suggest that it would be worthwhile to investigate the structure of semantic judgments further. The reduced number of scales was a less efficient predictor than the total of 44, a finding which does not support the suggestion that only those scales with markedly different means between the two centres were important in choosing between them. There are, however, other methods of reducing the number of scales necessary for behavioural prediction and these are the subject of the following section.

FACTOR ANALYSIS

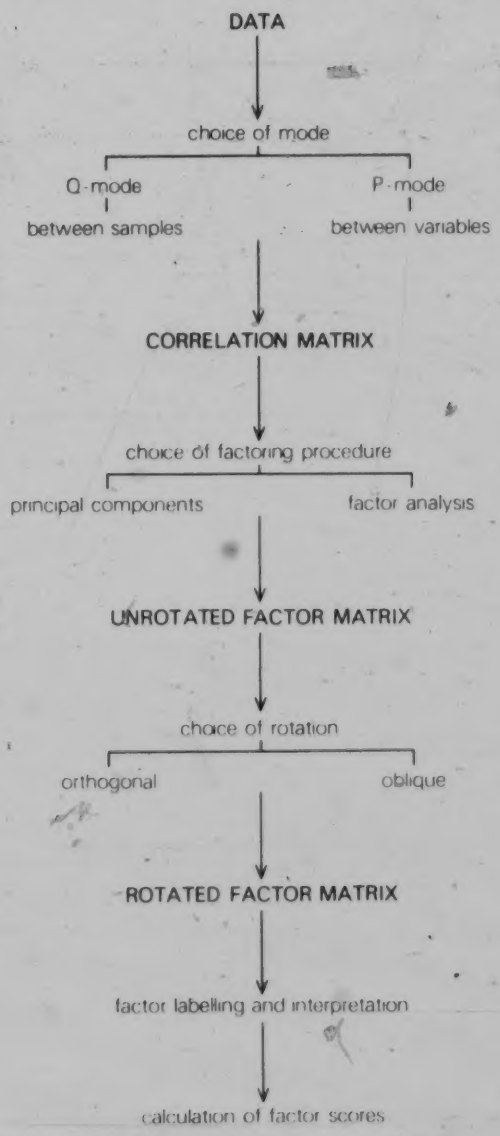
Factor analysis is a method of analyzing a set of observations for its intercorrelations to determine whether the variation in the data can be accounted for adequately by a number of basic categories smaller than that with which the investigation was started. That is the data may be explained in terms of a smaller number of reference variables. Factor analysis is based on the assumption that a set of intercorrelated variables has common factors running through it, and that the scores of an individual on the measures can be represented more economically in terms of these reference factors.

Any factor analysis involves two major steps - computation and interpretation. Reliance is now heavily placed on the computer to perform the first step. Nevertheless, methodological decisions must be made at each stage of the computation procedure, based on the nature of

the data and the purpose of the analysis. Figure 8 summarizes the steps and decisions necessary in a factor analysis. A geometric analogue for solving a factor analysis problem and a full discussion of the decision steps involved are included in Appendix B.

The output from a factor analysis is a set of factors that account for a substantial proportion of the common variance and the correlations of each of the original measuring scales with these factors. These correlations are the factor loadings. Interpretation of the factor patterns involves identifying those relationships which appear significant by selecting a meaningful factor loading cut-off level, above which a variable is deemed to be strongly related to a given factor. This level can best be established by an examination of the data themselves to determine what level makes for interpretable factors. When the variables which are strongly related to the factors have been identified each factor can be assigned a label which gives clues to the factor content by categorizing the findings and inferring what they have in common which is absent from variables not correlating highly with that factor (Fruchter, 1954).

Factor analysis has a variety of uses which are important here. These are delineating independent patterns in a body of data, structuring a domain and exploring an area where the interrelationships of phenomena have undergone little systematic investigation. Factor analysis is favoured here because it permits an exploratory or inductive approach to structuring attitudes which have only recently been investigated in depth and the research area is still a new one. The technique has been criticized on the grounds that without a priori



Upper case indicates inputs for analysis
Lower case indicates decision stages

Figure 8
THE STAGES OF A FACTOR ANALYSIS

reasoning, there is no yardstick against which the results can be evaluated (Armstrong, 1967). However, if the factors are treated as empirical findings and their relevance in developing principles of human behaviour is demonstrated, then the method can be justified. Williams (1971) has also criticized the technique on the grounds that the factors could have been identified simply by looking at the original data. This criticism is scarcely valid because even if groupings could be made, it would be difficult to determine which variables belonged to which group, or what proportion of the variance of each variable belonged to each group, nor could redundant and irrelevant scales be sifted out. If the limitations of the technique are considered, factor analysis can be a valuable and efficient technique for examining interrelationships in a body of data.

Factor analysis is only one of a number of multi-variate methods which can handle the input of a number of variables, unlike simple linear models such as correlation and regression. It is, however, the most appropriate technique here because it can handle variables which are correlated with more than one factor. That is, it can assign different portions of the variance of a variable to different factors. Cluster analysis, an older multi-variate technique now largely abandoned in favour of factor analysis (King, 1969), places each variable as a unit in a cluster and therefore requires pure loadings of variables on clusters. Discriminant analysis also does not allow for classification of a variable into more than one group. Factor analysis can also be used to explore a heterogeneous data set where no a priori groupings

have been postulated and this gives it further advantage over discriminant analysis which requires a priori groupings and then distinguishes between them on the basis of measurements appearing in the data matrix. Factor analysis was used to structure attitudes in this study because it was considered a more suitable technique in this context for grouping variables. A fuller review of this and other multivariate procedures can be found in King (1969) and Nunnally (1967).

Responses on each semantic differential scale were correlated with responses to all other scales to derive an interscale correlation matrix which was the basic input for the factor analysis. An image analysis was performed with orthogonal rotation to give a set of independent factors (Hakstian and Bay, 1972). Factors were interpreted by considering factor loadings greater than .5 and those between .35 and .5 which showed a stronger loading on one or more dimensions than others.

The data for each shopping centre were initially treated separately to determine whether the factor structures which emerged for each of the two centres were sufficiently similar to allow an amalgamation of the data. Later they were combined. Retention of factors was halted after four had been extracted since approximately all the estimated common variance had been accounted for. The fifth and following factors had uniformly low loadings and were uninterpretable.

Results

The semantic differential scales with high loadings on the four rotated factors are shown in Table 12 and the full matrices of factor loadings are presented in Appendix C. The first factor for centre A,

TABLE 12: SCALES LOADING ON FACTORS, WESTMOUNT AND SOUTHGATE

	Factor 1 Convenience/Reputation		Factor 2 Comfort		Factor 3 Congeniality		Factor 4 Functional Efficiency	
Westmount	reputable	.68	uncongested	.65	helpful service	.76	well-stocked	.59
	friendly service	.67	uncluttered	.56	personal service	.67	clean	.58
	accessible	.65	spacious	.55	varied	.59	orderly	.57
	well-known	.59	wide	.53	neighbourly	.55	popular	.57
	near	.52	uncrowded	.50	friendly atmosphere	.51	efficient	.50
	easy parking	.52	open	.46	attractive	.47		
	recommendable	.52	tidy	.44	entertaining	.47		
	tasteful	.52	quiet	.44	good value	.46		
	convenient	.51	spacious parking lot	.40	interesting	.46		
	honest	.51	relaxed atmosphere	.37	pleasant	.40		
	polite service	.49	high-class	.37	well-planned	.40		
	well-kept	.44			competitive	.38		
	spacious parking lot	.37						
Southgate	accessible	.68	uncluttered	.69	friendly service	.75	efficient	.67
	spacious parking lot	.62	uncongested	.64	friendly atmosphere	.68	pleasant	.64
	clean	.62	spacious	.58	sociable	.65	tasteful	.62
	easy parking	.59	uncrowded	.55	interesting	.58	varied	.60
	reputable	.56	quiet	.53	helpful service	.54	convenient	.59
	convenient	.56					orderly	.57
	well-kept	.53					recommendable	.56
	well-known	.52					personal service	.56
	popular	.50					well-stocked	.51
	honest	.50					good value	.50
	tidy	.47					competitive	.47
	large	.44						
	not busy	.43						
	well-planned	.43						
	near	.34						

Westmount, was identified as a convenience/reputation dimension since it is primarily composed of scales representing proximity, accessibility or convenience and honesty and reputability. Six of the thirteen scales loading on this dimension do not fall into these categories and seem to represent a pleasantness category. A convenience/reputation factor was similarly identified for Southgate, with nine of the same scales as Westmount loading on the factor. The second factor for each centre included elements which together contribute to a general sense of comfort. These are not only spaciousness and size but also quietness, brightness and relaxation. The third factor in each case was labelled the congeniality factor because it included the friendly and interesting aspects of the centres. For Westmount this factor was partially confounded by the inclusion of aesthetic scales as well. Factor four was identified as a functional efficiency dimension because of the appearance of orderly, efficient and well-stocked scales. Again, however, an aesthetic group of scales appears, this time for Southgate.

Since the same four factors were identified for each centre it appeared that the data sets were sufficiently alike to be combined. This was checked by the use of an orthogonal Procrustes rotation. Following the procedure outlined by Schonemann (1966), the degree of similarity between the factors was assessed. Given the rotated factor matrices, A and B for two factor analytic studies, an orthogonal transformation matrix, T, is applied to A to transform it as close as possible to B. The rotated matrix A then becomes an estimate of the target matrix P. The solution to the Procrustes problem is the transformation matrix T,

which gives the cosines of the angles through which the first of the two sets of factors have to be rotated to bring them back into congruence with the second set. Since the cosine of zero degrees (perfect fit) is unity, the closer the reported values are to unity, the greater the similarity between the two factor structures. However, since the reference axes of the factors are arbitrarily located in the first place, a better indicator of similarity is the error matrix, which shows the discrepancies between the two factor structures. The lower the values in the matrix the more similar are the two structures. An examination of the error matrix (Table 13) indicates that the two structures are indeed similar, and may be combined.

The data for both centres were, therefore, combined and submitted to a factor analysis. The scales loading on each of the four rotated factors are shown in Table 14 and the full matrix of factor loadings is presented in Appendix C. The first factor was identified as a congeniality/competitiveness dimension. There are few scales which do not clearly fall into these categories. Factor two is again identified as a comfort dimension, and all the scales loading on this factor contribute towards a general sense of comfort. The third factor was labelled the reputation/convenience dimension, although some elements of aesthetic appeal are present in the scales with lower factor loadings. Factor 4 is an aesthetic dimension, with all scales contributing to a general sense of visual interest and appeal. By including those scales with loadings between 0.35 and 0.5 some scales appear on more than one factor but this applies to only a few scales and does not especially confuse

TABLE 13: ERROR MATRIX FROM ORTHOGONAL PROCRUSTES ROTATION

	1	2	3	4
1	0.1284	0.2330	0.0807	0.0880
2	-0.0220	0.0913	0.2982	-0.7332
3	0.0002	0.0459	0.1077	-0.0385
4	0.0561	0.0052	0.1227	0.1432
5	-0.0065	0.0109	-0.0758	-0.3687
6	0.1960	0.2786	-0.1863	0.2596
7	0.0698	-0.0390	0.1809	-0.0188
8	-0.0923	0.2680	0.1672	0.0819
9	0.0729	0.0201	0.4095	-0.1862
10	-0.1867	-0.0975	0.2165	0.0782
11	0.5018	-0.1939	0.0389	-0.1380
12	0.1021	0.1126	0.3248	0.0017
13	-0.0995	-0.0422	0.0985	0.1494
14	-0.2361	-0.1407	0.0633	-0.0654
15	0.0209	-0.0032	0.1063	-0.0994
16	0.1173	-0.2409	-0.0694	0.0509
17	0.0039	-0.0361	-0.0973	-0.2054
18	-0.2611	-0.0635	0.2313	0.0025
19	-0.0365	0.2455	-0.0670	0.3910
20	-0.2185	-0.0670	0.3732	0.1404
21	-0.0900	0.0310	-0.1870	-0.3075
22	-0.0279	0.0350	-0.1163	-0.2966
23	0.0115	0.0988	-0.1241	-0.0665
24	-0.1634	0.0097	0.0230	-0.4615
25	0.0689	-0.2075	-0.0660	0.1645
26	-0.0685	0.2544	0.1191	0.3237
27	-0.1683	0.1374	-0.1350	0.0641
28	-0.0889	-0.1312	-0.1419	-0.3957
29	0.1974	0.0189	-0.2698	0.1979
30	-0.2006	-0.0851	-0.1194	-0.1916
31	-0.0883	0.0623	-0.0783	-0.1063
32	0.0624	0.0330	-0.2714	0.2269
33	0.3440	0.0422	-0.0648	-0.0155
34	-0.1518	0.0299	0.1078	-0.1502
35	-0.0481	0.0514	0.0691	-0.0421
36	-0.1040	0.0322	-0.2073	0.1513
37	-0.2030	0.0892	-0.0387	0.0052
38	0.0357	-0.0217	0.0821	-0.0110
39	0.2648	-0.1741	0.1305	0.2934
40	0.3138	0.1007	-0.0315	0.2262
41	0.0030	-0.0546	0.0759	0.3581
42	0.0884	0.0169	-0.0801	0.0085
43	-0.0959	0.1301	-0.0972	0.0258
44	0.0955	0.0214	0.0572	0.1992

TABLE 14: SCALES LOADING ON FACTORS, WESTMOUNT AND SOUTHGATE COMBINED

Factor 1 Congeniality/Competitiveness		Factor 2 Comfort		Factor 3 Reputation/Convenience		Factor 4 Aesthetic	
personal service	.66	uncongested	.65	accessible	.65	attractive	.55
good value	.62	uncluttered	.57	reputable	.63	interesting	.55
helpful service	.62	uncrowded	.53	well-known	.54	large	.55
friendly service	.61	quiet	.52	easy parking	.53	well-planned	.50
efficient	.59	spacious	.51	popular	.51	pleasant	.49
well-stocked	.55	wide	.47	convenient	.51	wide	.46
polite service	.54	open	.47	clean	.50	high-class	.46
varied	.54	orderly	.44	recommendable	.49	well-kept	.42
friendly atmosphere	.53	relaxed at-		honest	.49	entertaining	.41
recommendable	.46	mosphere	.42	well-kept	.45	clean	.40
pleasant	.45	bright	.38	near	.43		
orderly	.43			bright	.42		
tasteful	.42			spacious parking			
sociable	.40			lot	.42		
competitive	.40			tasteful	.39		
honest	.40			tidy	.35		
entertaining	.36						

the identification and labelling of the factors. Those scales with loadings greater than 0.5 load only on one factor each and identification of the factors using only these scales is straightforward.

Evaluation of results

Four factors have been identified in the preceding analysis. That is, scales describing the attributes of Southgate and Westmount shopping centres can be grouped into four major, independent categories. These factors were relatively identifiable and easy to label, although two were dual in character. One scale busy/not busy fails to appear at all in the factor structure, given factor loading cut-off levels. In addition if the factor-defining scales are taken as those with loadings of greater than .5 another 19 scales are eliminated. That is, the original 44 scales have been reduced to four groups defined by only 24 scales; parsimony of data has been achieved.

Since it was individual subject responses which provided the input for this grouping procedure, the four factors identified are important elements in categorizing the shopping centre characteristics in the minds of the respondents. The analysis has provided an understanding of which variables are important in evaluating shopping centres, and distinguishing one from another, and how these variables are related to each other. The factors form the basis of an examination of the attitude-behaviour relationship in the next chapter.

The results must also be evaluated in terms of their generality. That is, the cognitive categories which have been identified here must be compared with those identified in existing work for cross-verification.

There now exist a substantial number of studies which have measured and factored individual responses to environmental stimuli in a variety of settings which include shopping centres (Downs, 1970), libraries (Collins and Seaton, 1971), schools (Collins, 1969) and other buildings (Canter, 1969). Table 15 shows the results of eight studies in environmental description, including the present study.

The number of factors varies between studies; fewer were found in this study than in either Downs' or Taylor's shopping studies. The generality versus specificity of the factors also varies, but they appear to fall into eight major categories. Clearly, there are likely to be differences in the factors because of the different functions of the buildings, the different scales used and the different samples of subjects, but there is considerable similarity of results between the Edmonton study and the others. Two factors which were identified here are common to all studies. These are an aesthetic appeal and a comfort factor. In some studies these factors are broken down into more specific factors. Collins (1969) and Vielhauer (1965), for example, identify elements of cleanliness, ventilation and noise, which are all aspects of comfort. A factor which indicates organization or functional efficiency (an appropriate label whatever the function of the building in question) is common to a number of both geographical and architectural studies. It appeared in the separate analyses in the present study but in the final analysis with combined sets of data, scales describing this aspect of the centres loaded on other factors. Some anticipated differences are that in those studies where concern is solely with the architectural en-

TABLE 15: A COMPARISON OF FACTORS OBTAINED FROM EIGHT STUDIES IN ENVIRONMENTAL DESCRIPTION

	Geographical Studies			Architectural Studies				
	Downs 1970	Taylor 1972	Brown	Canter 1969	Collins 1969	Hershberger 1972	Vielhauer 1965	Janiskee (see Seaton and Collins, 1972)
Visual excitement/aesthetic appeal	Visual appearance	x	Aesthetic appeal	Pleasant/ impressive	Visual excitement, pleasantness	Pleasantness, novelty/excitement	Pleasantness, cheerfulness	Pleasant, interesting
Comfort	Atmosphere Ease of internal movement and parking	Noise	Comfort	Comfort	Spaciousness, noise, size, ventilation, cleanliness	Spaciousness	Spacious, clean, well-lit, ventilation, comfort	Calm and stable
Functional efficiency	Ease of internal movement and parking	Display characteristics Store arrangement and layout	x	x	Functional efficiency	Organization	x	x
Congeniality	Quality of service Atmosphere	x	Congeniality	Friendly and welcoming	x	x	x	x
Reputation	Reputation	Reliability Security	Reputation	x	x	x	x	x
Competitiveness	Price Range of goods Shopping hours	Cheapness Exclusiveness Boutiqueness	Competitiveness	x	x	x	x	x
Convenience	x	Convenience	Convenience	x	x	x	x	Accessible
Shape and texture	x	x	x	Texture	Shape	Texture	x	Texture

vironment such factors as convenience, competitiveness and congeniality are missing and conversely shape and texture elements are missing from the geographical studies. Different factors between studies appear to describe the same aspects of buildings and are simply labelled differently.

On the whole the factors derived in the Edmonton study are more general than those from other studies and this is a reflection of more general cognitive categorizations. There are also fewer factors, possibly reflecting a higher cut-off level for acceptance of factors.

These points can be further illustrated by a more detailed comparison with Downs' study which is similar to the Edmonton study. Downs hypothesized and identified eleven factors, one of which was uninterpretable. Only four interpretable factors were obtained here and they are more general and two are dual in character. Downs, for example, identified two separate factors of quality of service, composed of scales like helpful, friendly, good and polite service and atmosphere. In the Edmonton study these are combined into one congeniality factor. Similarly competitiveness in this study is conveying the same impression as three of Downs' factors - price, range of goods and shopping hours.

The emergence of underlying dimensions in this study which are similar to those obtained in other studies conducted in different environments, by different researchers with different samples and measuring scales, provides verification of the results of the present study. In addition, confidence in the development of a general structure of environmental evaluation is increased. This is a significant

finding both for the development of a theory of man-environment relationships and for the planning and design of the built environment. The ways in which people comprehend the various components of their everyday physical environment are identified.

The comparison of studies suggests that in future standardization of measuring devices and factor labelling procedures would be valuable. If a common language is developed for describing the environment, then data from different studies can be directly compared and cross-validation made possible. The need is for an agreed-on nucleus of descriptive scales which can be augmented to suit the needs of individual research. This, in turn, would permit more objective comparisons of factors between studies, using comparative statistics which go beyond the descriptive approach used here, which is all that is currently possible. The use of comparative statistics has recently been demonstrated by Davies and Barrow (1973) and the methods are reviewed in Nunnally (1967). The construction of theory in the behavioural sciences is dependent on the invariance of findings from different studies and standardized measurements and nomenclatures are crucial to proper identification of invariance. The findings of this study show considerable similarity with those from similar studies, and contribute to verification of the existence of major dimensions of environmental assessment. In addition the need for standardization is stressed and offers direction for further research.

SUMMARY

Attitudes of the sample group towards the two shopping centres

of Westmount and Southgate have been found to be generally favourable, and Southgate has been found to be preferred to Westmount. Preliminary analyses showed that these attitudes are reflected in shopping centre choice behaviour. The factor analysis of attitude judgments shows that the factor structure of respondent assessments of Westmount is essentially the same as that for Southgate. The image of these centres is composed of four cognitive categories, and these categories have been found to be common to a number of similar analyses of various built environments. The factors in the Edmonton study were fewer in number and more general in content than those identified in other studies. Individual scores on the four factors identified will give each individual's attitudinal assessment of the two centres on those variables which have been shown in this chapter to be important elements of total attitude structure. In the next chapter these important scales will be used to predict behaviour with respect to the two shopping centres, and the ultimate justification for studying and structuring attitudes must be their ability to predict behaviour.

CHAPTER 5

THE RELATIONSHIP BETWEEN ATTITUDES AND BEHAVIOUR

In the preceding chapter, attitude measurements based on the original 44 semantic differential scales, were related to shopping behaviour with 70 percent accuracy. Attitude judgments were then reduced to four basic dimensions using factor analysis. These four factors accounted for 45 percent of the total variance in the original data. In this chapter the techniques of behavioural measurement are evaluated and patterns of behaviour are examined and related to structured attitude judgments.

EVALUATION OF RESEARCH METHODS

One of the major difficulties in behavioural research is obtaining an accurate record of behaviour. In this study respondents were telephoned once a week and asked about their shopping centre visits since the previous call. This method worked well. The majority of respondents continued to participate in the study through two months of calls. Only seven refused to participate for this length of time and another eighteen could not be contacted regularly or at all.

A week was found to be a wise choice of .nterval. More frequent calls would have been both time-consuming for the caller and irritating for the respondent. On the other hand, respondents had little difficulty in recalling the events of the previous week. Several people, in

anticipation of the calls, kept a written record of their shopping centre visits. This suggests that there may have been a smaller sub-group within the sample who would have been prepared to participate in a more detailed study. The possibility of asking such a group to keep a diary of shopping trips is one suggestion for further research. It would probably be necessary to establish a rapport with the respondents in a less demanding study before this might become a viable possibility.

Using information from the telephone calls a checklist (shown at the back of the questionnaire in Appendix A) of each respondent's visits to Edmonton's eight largest shopping centres and downtown was compiled.

Many people, once they became familiar with the aims and objectives of the study, talked at length about their shopping habits. This willingness to volunteer information permitted four additional questions to be asked during the final telephone call. These questions were designed to provide information about actual patterns of expenditure and to verify observed preference patterns. These questions are included in Appendix A. No difficulties were encountered in obtaining this additional information and, in fact, many respondents volunteered a good deal more information in conversations which lasted up to half an hour.

PREDICTION OF PREFERRED CENTRE

Factor Scores

In the attitude-behaviour analysis in the preceding chapter, attitude scores were merely the sum of scale responses for each person for each shopping centre. Having identified the major structural dimensions of attitudes, it is now important to determine the relation-

ship between each individual's response and the factor structure so that the attitude-behaviour linkage can be further examined. Factor scores express the relationship between an individual's responses and the factor structure. There are a number of methods of calculating factor scores. They can be grouped into two major categories which might be labelled the regression and rational approaches.

Most factor analytic computer programmes include a subroutine for the calculation of scores by the regression method. It involves the calculation of a factor score coefficient matrix using a regression formula. This employs information provided by the factor loading matrix and the original correlation matrix. The observed data matrix, that is the original scale scores, are then post-multiplied by the factor score coefficient matrix, to give the matrix of factor scores (Hakstian and Bay, 1972). An illustration of the use of this method in psychology is provided by Elliot and Tannenbaum (1963), and in geography by King (1969).

The rational method of factor score derivation is based on a linear or summative model and involves summing the original scores of each individual on each scale, by factors. Since any factor is a real (observable) set of scores, in that each person has a score on the factor, the score for person 1, on factor A, is obtained by combining that person's scores on scales a through k, which are the defining scales for that factor (Nunnally, 1967). Thus:

$A = w_a a + w_b b + w_c c + \ldots\ldots\ldots\ldots w_k k$, where w_a is a weight. The same weights are used for all persons but since people tend to have different scores on the various scales, they will also tend to have

different scores on the factor. The use of the rational method involves two decisions: first, what scales are to be designated as defining the factors, and secondly, what weights are to be employed. The two problems are closely related. All scales may be assigned to factors, or some subset of scales may be chosen to represent the factor. McKechnie (1972), for example, assigns each variable to one factor, the one on which it loaded most highly, and suggests either summing the raw scores on each variable by factors or weighting each variable by its variance. Jakobovits and Osgood (1967) used only scores on the two highest loading variables on each factor to calculate factor scores. Alternatively, only those scales which have loadings of greater than 0.5, and which were used in factor interpretation and labelling, may be used. It is possible to criticize all these methods. If only a portion of the variables are used, information may be lost. On the other hand assigning all scales to factors requires relatively pure loadings. Nunnally (1967) and others have argued against weighting scale scores, on the grounds that it is difficult to justify any particular method of weighting over the method of simply summing unweighted ratings. Schmidt (1971) has also demonstrated that for prediction purposes weighting is generally not superior and in many instances it is actually inferior to unit weighting. In addition, as Likert (1932) discovered, weighted and unweighted summative scores are usually very highly correlated. In addition, if all scales are used to predict behaviour, through factor scores, there seems little point in undertaking a reduction process through factor analysis in the first place. Given that the aim is to predict behaviour from a reduced

set of variables, and the criticisms of weighting procedures, it seems justifiable to calculate factor scores by summing unweighted scores over some subset of variables. The ultimate justification, however, must be the predictive ability of the various methods. Because it allows first-hand manipulation and interpretation of the data, the rational method of factor score derivation is probably more valuable although the results of the regression approach are also presented here for comparison. McKechnie has demonstrated that there is a strong correlation (r ranged from .81 to .89) between the scores obtained from the two methods.

In this chapter, as in the preceding one, the ratio of a person's attitude scores towards Westmount and Southgate was calculated and a prediction of the most-frequented centre was made on this basis, as outlined earlier. A variety of predictive models, based on different methods of calculating factor scores, were used. In each case, individual factors had little predictive ability. Thus, for example, scores on the comfort or aesthetic appeal dimension alone were poorer predictors than factor scores summed across all four factors. Predictive levels and their significance varied between methods.

Results

The predictive ability and the advantages and disadvantages of the various methods of relating attitude scores to behavioural measurements are shown in Table 16. Factor scores derived from scores on the two highest loading scales on each factor accurately predicted 50 percent of choices when scores from the four factors were combined. This is a decrease in predictive accuracy of 11 percent compared with the use

TABLE 16: A COMPARISON OF METHODS OF RELATING ATTITUDE SCORES TO BEHAVIOURAL MEASUREMENT

	Method	Number of scales	Predictive ability	Significance level*	Advantages	Disadvantages
All Scales	Unstructured attitude scores	44	70%	1%	High predictive accuracy Easy and quick	No reduction of data set No contribution to explanation
	All scales weighted by factor loadings	44	very low	not significant		No reduction of data set No justification for weighting Very low predictive ability Time-consuming
Subsets of Scales	Unstructured attitude scores based on scales showing differences in mean response between two centres	29	60%	5%	Easy and quick Reduction of data	Loss of predictive ability
	Factor scores based on two highest-loading scales	8	59%	5%	Easy and quick Reduction of data	Loss of information Loss of predictive ability
	Factor scores based on factor-defining scales	24	65%	1%	Easy and quick Reduction of data Contributes to explanation	Small loss of information and predictive ability

* based on χ^2 with one degree of freedom

of unstructured attitude scales. Factor scores derived from scores on the factor-defining scales, that is those with loadings of 0.5 or greater on the four factors (24 of the original 44 scales), accurately predicted 65 percent of choices when scores on the four factors were combined.

Predictions based on factor-defining scales best combine significant predictive ability with reduction in the number of scales necessary. It should be noted that factor scores derived by the regression method were predictively far less efficient than those obtained by rational methods.

Evaluation of Results

These results suggest that reduction of attitude scales to a smaller number of underlying variables is a worthwhile procedure. The percentage of choices correctly predicted by scores on the factor defining scales is still significant at the one percent level but the number of predictive scales has been reduced almost by half. This reduction in the number of predictive scales necessary results in an economy of word usage, so that in similar future studies, only those scales which had relatively high and pure loadings on the factors need be used in attitude measurement. In addition the reduction of variables furthers our understanding of which shopping centre characteristics are important in the consumer decision process.

Although predictive ability cannot be further increased in the present study, a number of observations can be made about the data which give valuable insights into the research problem. Approximately 90 per-

cent of the subjects had well-marked behavioural preferences and it was in the remaining ten percent of cases that a large number of the predictive errors were made. Although it does not help our ability to predict behaviour, if the cases which do not have clear-cut behavioural preferences are eliminated, predictive ability increases by five to eight percent. In addition, it should be remembered that where a person visits the centres in question with equal frequency, the consequences of an incorrect prediction are less important than in the case where the respondent exhibits exclusive patronage behaviour.

As noted earlier, the two variables most frequently used in other studies to predict behaviour - distance and shopping centre size - were held constant in this study. However, perception of both these variables was considered. It is interesting to note that only 41 percent of the respondents perceived the centres as equidistant. All but five of these also thought that driving time to the two centres was approximately equal, indicating that perceived distance and perceived travel time are closely related. Only 13 percent of the respondents perceived the two centres as having the same number of stores. Neither of these variables had strong predictive ability; perception of distance alone could predict 53 percent(not significant) of cases accurately and perception of size alone could predict 57 percent (not significant) of cases. In many cases one of these variables confounded the other as for example a respondent would maintain a preference for Southgate because of its size but feel that Westmount was closer or more convenient. Since scales representing these two variables were included in the attitude measuring device, this

seems a more profitable way of using them in an explanatory model. Their predictive inefficiency makes a strong case for placing less emphasis on these variables in further research and for emphasizing the attitudinal variables.

An examination, in retrospect, of the incorrectly predicted cases shows that many could not possibly have been predicted from attitudes. A number of people in conversation admitted to holding a preference for one centre but for a number of reasons (summarized in Table 17) frequenting the other. In addition, the attitude measurements did not predict well in cases where there was no clearcut behavioural preference or where a respondent did the majority of her shopping at a location other than either of the two centres. The attitude scales included elements of centre size and accessibility but a third of the respondents whose behaviour was incorrectly predicted gave these as reasons why they visited the centre they did. It can only be concluded that in any such analysis there will always be a few people whose attitudes will not be

TABLE 17: MAJOR REASONS FOR VISITING NON-PREFERRED CENTRES

	No. responses
Ease of getting there (better route, better driving conditions)	10
Habit	5
Near place of work	3
Near or on way to other errand e.g. music lesson, private club	4

consistent with their behaviour and this may be a result of their own inaccuracies in the original attitude scaling.

The reasons for preferring one centre and visiting another are impossible to predict. However, they suggest some additional information which could be obtained in future studies. One of these is ease of driving. This could be used instead of distance, driving time or perception of these factors. The curvature of the road, the density of traffic and the number of traffic lights were all mentioned as disadvantages of a particular route. Questions about place of work could also be included. There remains the problem, however, of identifying those respondents to whom such considerations are important.

Summary

The first hypothesis of this study is restated here to facilitate discussion: a consumer located midway between two shopping centres of similar size and composition will choose between them on the basis of her attitude towards the characteristics of the two centres.

In the first section of this chapter attitude scores, based on four dimensions describing various characteristics of the two centres, were used to predict which of the two shopping centres would be visited more frequently. The ratio of attitude scores for Westmount to scores for Southgate was used as a predictor. The best predictive model was based on factor-defining scales. It combined the attributes of significant predictive ability with a reduction in the number of measuring scales necessary for prediction. This model correctly predicted the most frequently chosen centre in 65 percent of cases. Since this figure is sig-

nificantly greater than that expected by chance, the first hypothesis can be accepted.

PREDICTION OF FREQUENCY OF VISITS

The preceding analysis is an aggregative approach to the study of choice behaviour; that is, given shopping centre visits, aggregated over a period of time, the centre which will be visited more frequently was predicted 65 percent of the time. The aggregative approach is valuable, since it is important both to social scientists interested in theory construction and to shopping centre developers to know how a group's preferences will be expressed in shopping centre visits over a given time period.

It is also interesting to examine individual choice situations. That is, is preference expressed in exclusiveness of visits to one centre, or rather in a certain number or proportion of visits to the preferred centre? If the preferred centre is not visited exclusively, there remains the question of what reasons shoppers have for patronizing non-preferred centres.

Absolute frequency of visits to any centre is impossible to predict. It depends on factors such as whether a person enjoys shopping, whether they have a car and whether they work. If relative frequency of visit to shopping centres is reflected in the relative proportion of the consumer's shopping dollar spent at the various centres, then absolute frequency of visit is a less important aspect of choice behaviour, at least from the retailer's point of view. The relationship between rela-

tive frequency of visit and shopping expenditures is discussed later. Relative frequency of visit is of interest here and is discussed below.

Relative frequency of visit

Of the 112 people who were regular visitors to either Westmount or Southgate or both, only 24 visited one centre exclusively. The remaining 88 people visited both these centres and other centres in the city. This confirms the suggestions of Huff (1960) and the findings of the Owens-Corning study (1971) that consumers do not always choose the most desirable alternatives, with all other alternatives having zero probability of being selected. Rather, although the consumer may visit the most favoured centre more frequently than any other centre, she will rarely patronize it exclusively. Subjective value, or utility, is attached to the various alternatives which are then patronized in accordance with these values.

The concept of utility is briefly reiterated here for clarity. Utility is the value which the consumer attaches to visiting any particular shopping centre. Huff's probabilistic utility model of shopping visits stated that if the utilities associated with a set of centres j_1, j_2, j_3 and j_4 are 1:2:3:4:, then the consumer will choose the centre with the highest utility, j_4, 40 percent of the time, since:

$$\frac{4}{1+2+3+4} = \frac{2}{5} = 40\%$$

In the present situation it is possible to consider both the subset of two shopping centres, and the larger set of all regional shopping centres in the city, in the context of the concept of utility.

Westmount and Southgate. The frequency of visit to the two centres of Westmount and Southgate can be examined for regularities in the proportion of times the preferred centre is chosen. An initial step is to postulate that there is a direct relationship between the utility or relative favourability of attitudes towards the two centres and the relative number of visits to each. This postulate was tested by correlating the ratio of attitude judgments towards the two centres with the ratio of number of visits to the two centres. Since the correlation coefficient was low and insignificant, and no other functional relationship was apparent ($r=.13$, $df=129$) this line of exploration was not pursued. The lack of a direct relationship between the two sets of data suggests that it is not the difference in attitudes, but merely the fact that one is preferred that is important. This further suggests that a deductive approach should be abandoned in favour of an inductive approach; that is, attention should now be focussed on searching for empirical regularities. The frequency of visit data should be examined for trends in the proportion of visits to any one centre. Table 18 summarizes frequency of visit

TABLE 18: PROPORTION OF VISITS TO TWO CENTRES BY SAMPLE GROUP

	Numbers of people	Percentage of people
More than 90%	6	7
80-89%	25	28
70-79%	25	28
60-69%	15	17
50% of time	17	19
Totals	88	99 (due to rounding)

data, and from it, it is apparent that while there is considerable variation, the majority of people chose one centre more than 70 percent of the time. From this evidence it can be concluded that not only can 65 percent of aggregate choice behaviour be predicted, but also that in any individual choice between the two centres, the majority of consumers will choose the preferred centre at least 70 percent of the time.

The City as a Whole. When all regional shopping centres in the city and the downtown area (nine centres in all) are considered, empirical regularities are also apparent. It has already been noted that there were a number of people, nineteen in all, who were not regular visitors to either Westmount or Southgate. Of these, seven hardly shopped in any major centre over the two-month study period, and the remainder shopped elsewhere. In addition, several other people frequented one of the other centres, notably downtown, about as frequently as the centre they preferred from the Southgate and Westmount pair. Table 19 summarizes fre-

TABLE 19: PROPORTION OF VISITS TO ALL CENTRES BY SAMPLE GROUP

	Numbers of people	Percentage of people
100% - exclusive visits	6	5
90-99%	1	1
80-89%	12	9
70-79%	26	20
60-69%	32	24
50-59%	28	21
40-49%	22	17
30-39%	4	3
Totals	131	100

quency of visit data to the nine major shopping centres. From this it can again be concluded that exclusiveness of patronage is very rare, and of the six people noted two made only two visits in total to shopping centres. In a set of nine alternatives, we can also conclude that the preferred centre will be generally visited from 40-80 percent of the time, which indicates strong preference patterns with this number of alternatives.

These findings confirm that exclusive behaviour is the exception rather than the rule. The desire for a change, termed the utility of variation or the non-utility of boredom, was not given as a reason for choosing different centres. An examination of the questionnaire data indicates that special features and sales, as well as the reasons listed in Table 17 (page 101), are more important in selecting a variety of centres.

Summary

The second hypothesis is now restated: a consumer located midway between two centres of similar size and composition will distribute her patronage between the two centres in such a way that the probability of her choosing centre A is a function of the utility she attaches to that centre, where utility is a function of attitude.

An attempt has been made in the preceding section to predict the distribution of patronage, that is the proportion of times a centre would be chosen. A deductive approach to this proble showed a poor and insignificant relationship between the relative magnitude of attitudes and relative frequency of visit. Instead an inductive or exploratory approach was taken. It was concluded that there are noticeable regularities in the

proportion of times the preferred centre was chosen. These findings resulted in only a qualified acceptance of the second research hypothesis. While a consumer's choice of centre is related to her attitude, which in turn is a measure of the subjective value or utility that she attaches to a centre, it is not a direct function of the relative magnitude of her attitudinal preferences. Rather it appears to be related more to externalities such as sales and other errands, which the attitude measures did not, and probably could not, incorporate.

CONCLUSIONS

In conclusion some final comments can be made about respondents' behaviour. Behavioural preferences were well-marked. Approximately 70 percent of the respondents showed a strong behavioural preference for Southgate, and the remaining 30 percent just as strongly preferred Westmount. Very few people did their major shopping at centres other than these two. A marked exception is that families with young children visit Bonnie Doon or Meadowlark because Simpson Sears stores at these centres are considered the best outlet for children's clothing. The majority of respondents spent most of their consumer dollar at their preferred centre, with the exception of convenience goods. Many people bought groceries locally since the local supermarket gave a five percent discount on Tuesdays. Drugstore items were also purchased locally in many cases.

Prior to the opening of Southgate in 1970, most people shopped at Westmount. Given that purchasing power in a community is relatively inelastic, Westmount must have lost trade to Southgate, which has been shown in this study to be preferable because of its spaciousness, aesthe-

tic appeal and generally well-planned characteristics.

In this chapter respondents' attitudes towards the characteristics of the two centres have been shown to be significant predictors of their behavioural preferences and empirical regularities in the way that these preferences are expressed have been identified.

CHAPTER 6

SUMMARY AND CONCLUSIONS

The aim of this thesis was to identify the underlying determinants of consumer spatial behaviour, in order that this behaviour might be explained and predicted. To fulfill this aim the traditional explanatory variables such as distance to a shopping centre and its size and the demographic and socio-economic characteristics of consumers were de-emphasized. Instead the emphasis was placed on attitude as an explanatory variable. More specifically, an attempt was made to identify the major attitudinal components which influence behaviour, and to determine which of these components, or which combination of them, best explain and predict observed behaviour. This chapter reviews the results of the research and assesses the extent to which the aims outlined above have been fulfilled. The research techniques are evaluated and the implications of the research for theory construction are reviewed. In the light of this and other work some suggestions for ongoing research are made.

SUMMARY OF RESULTS

Attitude judgments were condensed using factor analysis into four major categories, identified as congeniality/competitiveness; comfort; convenience/reputation; and aesthetic appeal. Factor scores were calculated for each respondent on these four dimensions and the scores used

to predict their behaviour with respect to shopping centre choice. None of the factors alone had strong predictive ability. However, a combination of scores on the four factors allowed 65 percent of the cases at the aggregative level to be accurately predicted, with a substantial reduction in the number of scales necessary. No direct relationship was found between the ratio of attitudes towards the two centres and the ratio of visits to those centres. However, there is empirical evidence that although the consumer does not shop exclusively at one centre, she visits, in most instances, her preferred centre a high proportion of times.

EVALUATION OF RESULTS

Since distance to each shopping centre and centre size (number of stores) and the socio-economic status of the consumer were held constant, attitude was emphasized as the predictive variable. That over 65 percent of aggregate choice behaviour could be predicted using this variable alone is a major research finding, particularly in view of Harvey's (1969) scepticism about the value of attitude as an explanatory variable. In addition neither perception of distance nor centre size alone were significant predictors of choices in this study. This is not to say that distance and centre size are not important variables in shopping centre choice but rather that they are poorer predictors than attitude, especially in cases where alternative centres are similar in terms of these two characteristics. Since distance and size can be included in attitude measuring devices, with the inclusion of appropriate scales, it is concluded that these variables are not only insufficient for behavioural

prediction but also unnecessary. Attitude by itself has strong predictive ability.

Another important research finding is that it has been possible to reduce the number of attitudinal variables from the original 44 to four basic dimensions, defined by 24 variables, while maintaining significant predictive ability. This means that in further research attitude can be a much more economical measure because of the reduction in the number of scales necessary. Since semantic differential judgments should be quick, "off-the-top-of-the-head" responses, they are not especially time-consuming. However, the mere sight of a lengthy list of scales may discourage some respondents or simply limit the number of people that can be interviewed.

EVALUATION OF RESEARCH METHODS

The Semantic Differential

The semantic differential, as discussed in Chapter 4, was found to be a good attitude measuring device. There has recently been some criticism of the semantic differential (Seaton and Collins, 1972) on the grounds that response to a word and response to the item it represents may be two entirely different things. This criticism applies to any semantic measuring device, however, and since, as Hershberger (1972) has pointed out, people are familiar with semantics as means of expressing themselves and conveying information, it seems only reasonable that measuring devices should use familiar modes of expression. The measuring instrument used will always reflect the personal preferences of the researcher and in this case the use of the semantic differential seems

justified given its significant predictive ability. What is more important than changing measuring instruments is cross-validation of results across different semantic studies to determine whether there are strong similarities in findings. In addition, there has been some controversy over the derivation of semantic scales. Seaton and Collins have argued that the time has come for a pool of items from which researchers can draw. However, this pool would have to be unnecessarily large to be comprehensive and still might not contain words appropriate for a particular study. As the list provided by Nunnally (1959) illustrates, common words in one discipline such as psychology do not cover some items relevant to description in other fields. A pool of items would, therefore, be appropriate only for the field of study in which it was designed. Since there are areas of overlap, however, it would seem more reasonable to have a basic nucleus of standard assessment adjectives. This can be supplemented in any individual study by scales found to be relevant through preliminary investigations using such techniques as the photographic method developed here.

Behavioural Measurement

One of the major difficulties in behavioural research is actually obtaining a behavioural record. In this study extensive use of the telephone appears to give accurate and relatively easy to obtain results. The advantages and disadvantages of this method have already been fully discussed in Chapter 5 and are not repeated here.

IMPLICATIONS OF THE STUDY

The study has important implications both for social scientists

interested in theory construction and for planners and designers interested in constructing the built environment.

Implications for theory construction

This study aimed at uncovering some basic relationships between predictive variables and consumer spatial behaviour in the urban environment. Attitude has been found to be an accurate predictor of behaviour, which also offers an explanation of this behaviour. Attitudes suggest a tendency to respond in a consistent fashion to stimuli, they are indicative of actions. Respondents made judgments on a variety of scales from which it was possible to isolate those dimensions which are important contributors to overall attitudes. These dimensions compare well with those obtained from other studies of environmental response although they are fewer and more general in character. Individually the factors did not have high predictive ability but, when combined, predictive ability increased considerably. This leads to the conclusion that aspects of convenience, reputation, comfort, congeniality, competitiveness and general aesthetic quality are all important considerations in shopping centre decisions, and this indicates why the traditional variables of distance and centre size are inadequate as predictors of behaviour.

The findings of this study are significant not just for a theory of consumer behaviour but for a theory of human spatial behaviour in general. The methods used and the results obtained can be transferred to other studies of leisure behaviour, choice of residence and any other spatial decision-making behaviour. The study was designed to apply at

any scale from competition between two small retail facilities on a single block to behaviour patterns in the whole intra-urban and even inter-urban context. Refinements and alterations can be made to the specific methods used to meet the requirements of any situation but the general methodology and theory holds for any spatial choice situation.

Implications for Planners and Designers

The study has shown that there is a generalized set of factors which together are important in predicting shopping centre choice. Elements of visual appeal and comfort are important to the consumer and more stress on these factors in shopping centre design should increase centre attractiveness. As an increasing number of shopping centres are developed in cities, distance is likely to become progressively less important as a choice variable. Consumers will have more choices available within acceptable travelling range. In addition, perception of distance and centre size has been found to be inconsistent with reality. There is a strong case, therefore, for stressing attitudinal variables in centre location and design, and emphasizing these aspects in centre promotion.

CONCLUSIONS

The concluding comments on this study must be on its success in accomplishing the research aims set out at the beginning, and on its ongoing nature. The two research hypotheses are restated below:

Hypothesis 1. A consumer located midway between two shopping centres of similar size and composition, will choose between them on the basis of her attitude towards the two centres.

Hypothesis 2. Such a consumer will distribute her patronage between the two centres in such a way that the probability of her choosing centre A is a function of the utility she attaches to that centre, where utility is a function of attitude. The first hypothesis is accepted, but the second is accepted only with qualifications. Utility was not found to be a direct function of attitude, and empirical regularities in shopping centre visits were, therefore, examined. It was found that consumers do distribute their patronage between centres, but that this appears to be a function of external, rather than attitudinal, utility.

Some general suggestions have been made for ongoing research and this is considered important. The value of attitude as a research tool has been questioned, largely because of the failure to successfully relate attitudes and behaviour. This study has concluded, under experimental conditions where some variables were held constant, that attitude is an important behavioural predictor and that it should be included in future research in human spatial behaviour. In addition, traditional variables might best be included as attitudinal variables, since it is their motivational significance for the individual which is the important consideration.

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APPENDIX A

DEPARTMENT OF GEOGRAPHY:UNIVERSITY OF ALBERTA
SHOPPING CENTRE STUDY

Q1. How long have you lived at this address:
1. less than 6 months
2. 6 months to a year
3. 1-2 years
4. more than 2 years

Q2. Have you visited these two shopping centres:
1. Westmount
2. Southgate
3. both
4. neither

Q3. Which of these two centres do you think is closer to your home:
1. Westmount
2. Southgate
3. they are equally close

Q4. Which of these two centres do you think has the most stores:
1. Westmount
2. Southgate
3. they have about the same number

Q5. How do you <u>usually</u> get to each of these centres:
1. car
2. bus
3. taxi
4. other-specify

Q6. How long does it take you to get there:
1. Westmount
2. Southgate

Would you please complete these two forms. This sheet explains how it should be done.

DEPARTMENT OF GEOGRAPHY:UNIVERSITY OF ALBERTA
SHOPPING CENTRE STUDY

The purpose of this study is to examine the impressions shoppers have of shopping centres, by having them judge the centres against a set of descriptive scales. In completing the scales, please judge the centre on the basis of your own feelings. Each centre is to be rated on each scale in the following manner:

If you feel that the centre indicated at the top of the page is well described by one of the adjectives at the ends of the scale, please place a cross as shown below:

good ___:___:___:___:___:___:_x_ bad

OR

good _x_:___:___:___:___:___:___ bad

If you feel that the centre is quite closely described by one or other end of the scale, but not completely so, please place a cross as shown below:

dirty ___:___:___:___:___:_x_:___ clean

OR

dirty ___:_x_:___:___:___:___:___ clean

If the centre seems only slightly described by one or other of the adjectives, but is not really neutral, please mark as follows:

quiet ___:___:___:___:_x_:___:___ noisy

OR

quiet ___:___:_x_:___:___:___:___ noisy

If you consider the centre to be neutral on the scale, that is equally well described by either adjective, or if the scale seems irrelevant, then please mark the middle space:

pleasant ___:___:___:_x_:___:___:___ unpleasant

Please be sure to check the middle of the spaces, and not the boundaries:

pleasant ___:___:___:___:_x_:___:___ unpleasant
(x: right; x: wrong)

Please check each scale once and only once. Do not omit any scales. The judging should be done rapidly, and be based on first impressions, so please do not worry or puzzle over a particular scale. Make each judgement separate and independent, and do not refer back to your earlier judgements.

Thank you.

WESTMOUNT SHOPPING CENTRE

	1	2	3	4	5	6	7	
chaotic								orderly
spacious								cramped
relaxed atmosphere								tense atmosphere
rude service								polite service
competitive								uncompetitive
unpopular								popular
inefficient								efficient
poor value								good value
sociable								unsociable
busy								not busy
narrow								wide
uncluttered								cluttered
well-known								little-known
near								distant
uncongested								congested
untidy								tidy
easy parking								difficult parking
not recommendable								recommendable
dark								bright
friendly service								unfriendly service
accessible								inaccessible
personal service								impersonal service
unneighbourly								neighbourly
tasteful								distasteful
cramped parking lot								spacious parking lot
friendly atmosphere								unfriendly atmosphere
reputable								disreputable
inconvenient								convenient
open								constricted
attractive								unattractive
varied								boring
helpful service								unhelpful service
entertaining								dull
unpleasant								pleasant
crowded								uncrowded
well-kept								badly-kept
quiet								noisy
high class								low class
uninteresting								interesting
small								large
dirty								clean
well-planned								poorly-planned
dishonest								honest
badly-stocked								well-stocked

SOUTHGATE SHOPPING CENTRE

	1	2	3	4	5	6	7	
unfriendly atmosphere								friendly atmosphere
uninteresting								interesting
small								large
poor value								good value
neighbourly								unneighbourly
uncongested								congested
unsociable								sociable
unfriendly service								friendly service
reputable								disreputable
entertaining								dull
competitive								uncompetitive
polite service								rude service
spacious								cramped
distant								near
low class								high class
popular								unpopular
little-known								well-known
accessible								inaccessible
dark								bright
tidy								untidy
not recommendable								recommendable
orderly								chaotic
easy parking								difficult parking
dirty								clean
open								constricted
unattractive								attractive
crowded								uncrowded
well-stocked								badly-stocked
tasteful								distasteful
cramped parking lot								spacious parking lot
poorly-planned								well-planned
honest								dishonest
convenient								inconvenient
cluttered								uncluttered
unhelpful service								helpful service
noisy								quiet
busy								not busy
personal service								impersonal service
badly-kept								well-kept
unpleasant								pleasant
relaxed atmosphere								tense atmosphere
boring								varied
efficient								inefficient
wide								narrow

Behavior Measurement Checksheet

Name:

Telephone number:

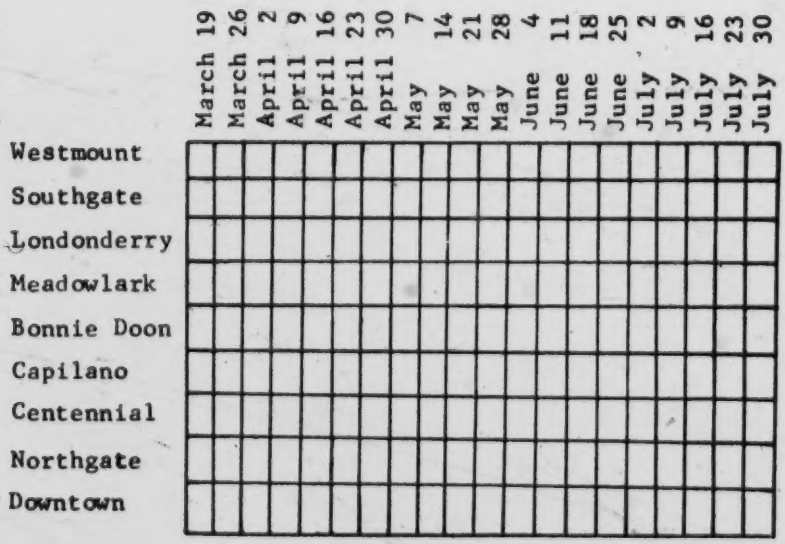
Address:

Q1. Have you visited Southgate or Westmount since I last contacted you? How many times?

Q2. Have you visited any of the other major shopping centres (Londonderry, Meadowlark, Bonnie Doon, Capilano, Centennial, Northgate) since I last contacted you? How many times?

Q3. Have you been downtown to shop since I last contacted you? How many times?

Week beginning



ADDITIONAL QUESTIONS

1. You appear to have visited centre "x" most frequently over the last two months. What is it you particularly like about this centre?
2. Where did you shop primarily before Southgate was built?
3. Where do you shop for:
    a) groceries?
    b) drugstore items?
4. Is the relative proportion of times you visit a centre reflected in the relative proportion of your consumer dollar that you spend there?

The following six photographs are those used in the preliminary study. They show, in order, the centres of Southgate, Westmount, Centennial, Capilano, Meadowlark and Bonnie Doon.

MULLINGWORTH

APPENDIX B

FACTOR ANALYSIS

Computation

Factor analysis reduces a set of observations to a smaller number of basic dimensions by examining their intercorrelations. The relationships between the observations can be expressed geometrically. In a vector space, where the vectors are of unit length, the correlation coefficient r between two variables is the cosine of the angle between them. Thus, where

$$r_{12} = .8 = V_1 V_2 \cos \phi$$

$$\phi = 37°$$

Graphically, the relationship is shown as:

When the correlation is positive, the angle between the two vectors is acute; when it is negative, the angle is obtuse. Thus, where

$$r_{12} = -0.8 = (180° - \text{cosine } \phi)$$

$$= (180° - 37°)$$

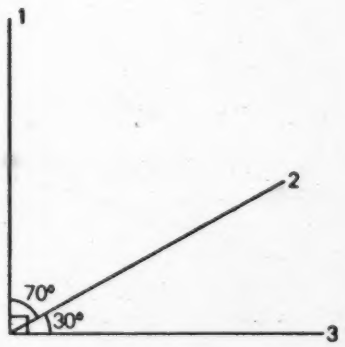
$$\phi = 143°$$

Given a number of intercorrelations factor analysis seeks to determine the minimum number of dimensions which are necessary to portray the relationships between the variables correctly. Thus, given a table of

intercorrelations:

	1	2	3
1	1.0	.342	0
2	.342	1.0	.866
3	0	.866	1.0

The graphical representation of these relationships is:

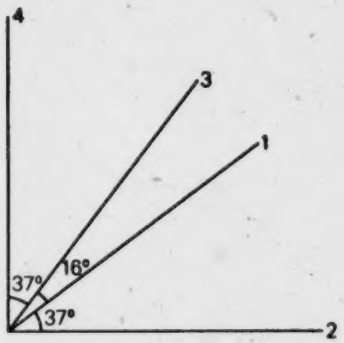


However, since 30°+70°=100°, $r_{12}+r_{23} \neq r_{13}$. This is because the two-dimensional representation shown is not adequate to accommodate all the relationships correctly. A three-dimensional representation is required. This indicates that the correlation matrix is of rank three, that is, it requires three reference vectors to represent the angular relationships, and would thus have three factors.

Given another table of intercorrelations:

	1	2	3	4
1	1.0	.8	.96	.6
2	.8	1.0	.6	.0
3	.96	.6	1.0	.8
4	.6	.0	.8	1.0

Graphically, the relationships can be shown:



Since 37°+16°=37°=90°, then a two-dimensional representation is correct, that is, there are only two independent factors. All four of the vectors are in the same plane and are linearly interdependent. In a factor analysis reference vectors are located which are used to express the relationships. In this example vectors 2 and 4 can be used. Thus, the vectors can be expressed as:

$$V_1=0.8V_2+0.6V_4$$

$$V_2=1.0V_2+0V_4$$

$$V_3=0.6V_2+0.8V_4$$

$$V_4=0V_2+1.0V_4$$

Isolating these relationships is equivalent to a factor analysis of the four variables, accounting for the interrelationships between the four in terms of only two reference variables. The results are generally expressed in abbreviated matrix form:

	Factor		
Variable	I	II	h^2
1	0.8	0.6	1.0
2	1.0	0	1.0
3	0.6	0.8	1.0
4	0	1.0	1.0

The values in columns two and three are termed factor loadings, and they may be used to interpret the factors, since they show the relationship of the variables to the factors. The values in column four, the h^2 values, are the communalities, that is the portion of the variance of each variable which is correlated with the other variables. The values are given by the sum of the factor loadings squared, across rows. It should be noted that the length of a vector equals h, that is the square root of the communality. In reality, the communality rarely attains one, due to unreliability and the specific, or uncorrelated, content of the variables. Thus, if the length of a vector is less than one, its correlations with other variables are proportionately decreased because $r_{12}=V_1V_2\cos\text{ine }\emptyset$, where $\emptyset$ is the angle between V_1 and V_2.

Thus, factor analysis determines the number of dimensions necessary to account for the interrelationships of a set of variables, and determines a set of arbitrary reference vectors (factors), in terms of which the vectors representing the variables can be expressed. The geometric solution to a factor analysis can be found only up to three dimensions, beyond that matrix algebra is needed for the computation of factors, but an understanding of the geometry of factor analysis permits

a better appreciation of the computational processes.

The reference vectors which were selected in the example above were purely arbitrary, there is no unique location for the frame of reference vectors. Although a table of correlations has only one configuration of vectors, this configuration can be described with reference to an infinite number of locations of the frame of co-ordinate reference axes. Various locations of the reference frame can be obtained by rotating the reference axes around the origin. The aim of this procedure is to eradicate medium value loadings and produce a mixture of very high or very low factor loadings for the cells of the factor matrix. Rotation does not change the relative position of the points, but rather only influences the position of the axes used to describe these points.

Given a factor matrix:

	Factor		
Variable	I	II	h^2
1	0.6	0.4	0.52
2	0.6	0.6	0.72
3	0.7	-0.3	0.58
4	0.4	-0.5	0.41

Graphically, the relationships can be represented as:

In order to redistribute the variance, and eliminate medium value loadings, rotation may be performed, either clockwise or anticlockwise. The procedure results in a new set of factor loadings, which are given by:

Clockwise rotation

$$a'_{j1} = a_{j1}\cos\theta - a_{j2}\sin\theta$$

$$a'_{j2} = a_{j1}\sin\theta + a_{j2}\cos\theta$$

where

θ is the angle of rotation

a'_{j1} is the rotated loading of variable j on factor 1

a'_{j2} is the rotated loading of variable j on factor 11

a_{j1} and a_{j2} are the loadings prior to rotation on factor 1 and factor 11 respectively.

Anticlockwise rotation

$$a'_{j_1} = a_{j1}\cos\theta + a_{j2}\sin\theta$$

$$a'_{j2} = -a_{j1}\sin\theta + a_{j2}\cos\theta$$

Rotating clockwise 50°gives the following values:

a'_{11}=0.6x0.643-0.4x0.766, since sin50 = 0.766 and cos50 =0.643

=0.0794

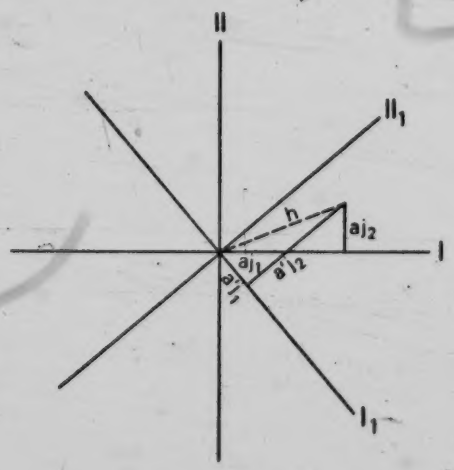
a'_{12}=0.6x0.766+0.4x0.643

=0.7168

The full matrix of rotated factor loadings is:

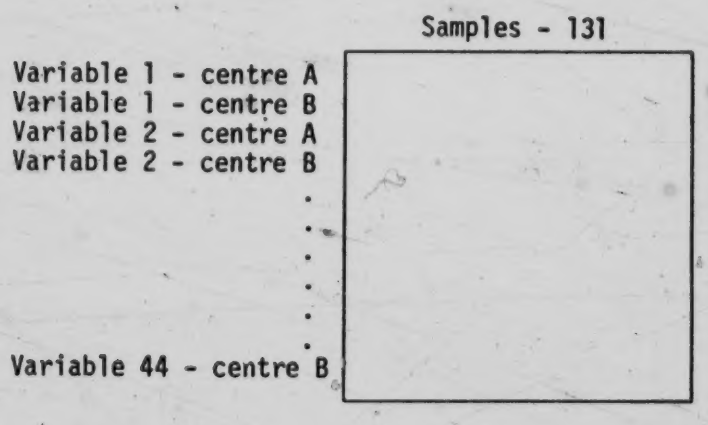
	Factor		
	1	11	h^2
1	0.08	0.72	0.52
2	-0.07	0.85	0.73
3	0.68	0.34	0.58
4	0.64	-0.02	0.41

After rotation variables 1 and 2 are found to be strongly related to factor 11 and variables 3 and 4 are found to be strongly related to factor 1. It should be noted that the communalities are relatively invariant (Pythagoras theorem).



Decision Stages

Data. Data for a factor analysis must be in a form which can be converted to a matrix, usually a correlation matrix. That is, they must involve a series of readings for a series of measurement units. The attitude data, however, are in the form of a cube comprising the scores of each respondent, on each scale, for each concept. Thus, the cube has the dimensions 131 respondents x 44 scales x 2 shopping centres. This cube must be reduced to an appropriate form by a stringing-out procedure, as shown below, which is suitable for conversion into a correlation matrix.



Choice of mode. The two most common choices of mode are Q-mode and R-mode although there are actually six possibilities for studying co-variation among data. These are across variables, sample units and occasions. These possibilities fall into three pairs in which one of the pair is the transpose of the other. For example, R-mode analysis involves the correlation of tests administered to a sample of people on a single occasion. That is, it examines the relationship between

variables. Q-mode, its transpose, examines the relationship between sample units for one variable at a given time period. O and P-mode analyses examine the relationship between variables and the relationship between time periods respectively, for one sample unit, while S and T-mode analyses examine the relationship between sample units and occasions respectively for one test or variable. Since the aim here is to interrelate a number of tests administered to a group of individuals at a given time period R-mode analysis is the appropriate choice.

Given a data set in the correct form, and the choice of the appropriate form of analysis, a correlation matrix is derived. This serves as the input for the next stage of the analysis, the actual factoring procedure.

Choice of factoring procedure. There are two basic methods by which a set of data can be reduced to a smaller number of dimensions. These are factor analysis and principal components analysis. Although it is a misnomer to call principal components analysis a type of factor analysis, many studies have confused the two. In choosing between them it is important to note that there are important differences as King (1969) has pointed out. The major difference is in that portion of the variance in the data set with which each deals. The variance in a data set is composed of the common variance, plus the variance specific or unique to individual variables plus the error variance. The principal components technique patterns all the variance in a set of data whether common or unique. More specifically, when a variable is uncorrelated with other variables, that is it has only unique variance, the principal components

solution will put an axis through this random variable since it is positioned orthogonally to the others. Factor analysis on the other hand, deals only with the common variance and examines the response of the variables solely to the influences termed common factors. The variance on each variable is systematically divided between the factors and the variation unique to a variable is ignored.

In choosing the model most appropriate for structuring the attitude domain, the aims of the analysis must be kept in mind. The scales on which the attitude measurements were based were selected to be as inclusive as possible of the full domain of the attitude structure. It is the job of the factoring procedure to identify those scales which make a significant contribution to the total variance and to eliminate those which do not. Principal components analysis, with its treatment of random variables, seems unsuitable for the task of identifying these common factors. A true factor analysis is preferable, and of the various procedures available, image analysis seems most appropriate for the data set. As well it is mathematically more elegant than common factor analysis (Rummel, 1967).

The choice of factor analysis also presents the question of how many factors are to be retained and rotated. In a principal components solution those factors with eigenvalues greater than one are generally retained, but this criterion is inappropriate for a factor analysis. Another criterion is to halt extraction of factors when less than a predetermined percentage of the variance, for example 5 percent, is explained by the next factor. In practice a pilot study can be useful in

indicating the number of factors likely to emerge and to this a safety margin of say two factors can be added. In any event, after rotation it soon becomes clear which factors are interpretable and which are not.

The result of the factoring procedure is an unrotated factor matrix giving the loadings of each of the 44 variables on each of the factors. From this the percent of variance explained by each factor and the communalities can be calculated. In the unrotated matrix factor one delineates the largest pattern of relationships in the data, the second the next largest pattern and so on. Thus, the amount of variation in the data described by each pattern decreases successively with each factor. Loadings in the unrotated matrix tend to assume medium values. In order to interpret the factor patterns it would be more helpful to locate the factor axes in such a way as to produce a mixture of very high or very low factor loadings. Rotation of the factor axes is the method by which relocation of the axes is achieved.

Choice of rotation procedure. There are two methods of rotation: orthogonal rotation, where the reference axes remain at right angles to each other and oblique rotation, where the axes are rotated independently of each other. The decision about which to use again depends on the intention of the researcher. Orthogonal rotation has the advantage that the axes are uncorrelated and represent theoretically independent factors. These independent factors can then be used as a reduced set of variables for ongoing analysis, such as the prediction and explanation of a dependent variable. In addition orthogonal factors are much simpler to work

with, computationally and graphically. There are a number of necessary but difficult concepts to be understood in oblique rotation, such as simple axes and primary axes, and pattern and structure, as Fruchter (1954) has noted. In orthogonal rotation these distinctions disappear. Fruchter has also pointed out that except for instances of highly correlated factors, there is little difference in the interpretation of the factors derived from the two approaches and that the added complications of oblique factors make little practical difference. A final difficulty with oblique rotation is deciding how oblique the factors must be before they can no longer be considered independent. The answer to this must be arbitrary. Oblique rotation has the advantage that a number of measures in the real world tend to be related. If the aim of the analysis is to illustrate the clearest patterns in the data, it is unwise to force independence on the factors since oblique solutions have greater flexibility in searching out patterns regardless of their correlation. In addition, the amount of obliqueness is itself an important piece of information. It should be noted that orthogonal rotation is really a subset of oblique rotations. If the clusters of relationships are in fact uncorrelated, then oblique rotation will result in orthogonal factors. Thus, the difference between the two is not in discriminating uncorrelated and correlated factors but in determining whether this distinction is empirical or imposed on the data by the model.

Since emphasis here is in generating a number of dimensions which may be treated as a reduced set of variables in a predictive model, or-

thogonal rotation was selected. The output from the rotation is the transformed matrix. Similar in format to the unrotated matrix, the transformed matrix delineates distinct clusters of relationships among the variables. In an orthogonally rotated matrix, however, no significance is attached to the order of the factors.

APPENDIX C

In the following unrotated matrices the percentage total variances explained by each factor is given by:

$$\frac{\Sigma x^2}{n}.100$$

where x are the factor loadings summed by column and

n is the number of variables

The percentage of total variation in the data which is patterned, that is the common variance, is the sum of these values for all the factors, and is also equal to:

$$\frac{\Sigma h^2}{n}.100$$

where h^2 is the communality and n the number of variables.

h^2 is given by:

$$\Sigma x^2$$

where x are the factor loadings, summed across rows.

TABLE 1: UNROTATED FACTOR MATRIX, WESTMOUNT

	1	2	3	4	h^2
1	-0.5400	-0.1900	-0.1400	0.3500	0.4698
2	-0.4300	-0.4200	0.2200	-0.0700	0.4146
3	-0.5000	-0.2500	-0.0100	0.0400	0.3142
4	-0.7300	0.0200	0.0900	0.0400	0.5430
5	-0.4400	0.0300	-0.0800	-0.2200	0.2493
6	-0.6500	0.2600	0.0300	0.2900	0.5751
7	-0.6600	-0.0700	-0.0800	0.1900	0.4830
8	-0.5800	0.1800	-0.1700	0.0600	0.4013
9	-0.3300	0.0600	0.0300	-0.2400	0.1710
10	0.2500	-0.3200	-0.0100	0.0300	0.1659
11	-0.2100	-0.5400	-0.1200	0.1900	0.3862
12	-0.1700	-0.5000	0.1100	-0.2100	0.3351
13	-0.5200	0.2500	0.3200	0.0100	0.4354
14	-0.4200	0.0800	0.3200	-0.1100	0.2973
15	-0.2800	-0.5700	-0.0900	-0.1400	0.4310
16	-0.5900	-0.2800	0.0500	0.0200	0.4294
17	-0.5100	-0.0100	0.2400	-0.1800	0.3502
18	-0.7100	0.0400	0.1700	0.1100	0.5467
19	-0.6500	-0.0900	0.0900	0.1400	0.4583
20	-0.7500	0.0700	0.1600	-0.1900	0.6291
21	-0.6400	0.2100	0.2500	-0.1500	0.5387
22	-0.6400	0.0800	-0.2800	-0.2800	0.5728
23	-0.5700	0.1600	-0.2300	-0.0900	0.4115
24	-0.5900	0.0100	0.1300	-0.2000	0.4051
25	-0.5400	-0.2400	0.1300	-0.0600	0.3697
26	-0.6600	0.2500	-0.1100	-0.0700	0.5151
27	-0.7100	0.0600	-0.2500	-0.0200	0.5706
28	-0.7500	0.1500	-0.3800	-0.1200	0.7438
29	-0.3500	-0.0600	-0.3900	0.0300	0.2791
30	-0.6100	-0.0200	-0.1100	0.0300	0.3855
31	-0.1400	-0.4800	-0.0600	-0.0500	0.2561
32	-0.6300	0.0700	0.0900	0.0800	0.4163
33	-0.4400	-0.3500	-0.1200	0.0400	0.3321
34	-0.4600	-0.2500	0.0	-0.0	0.2741
35	-0.6600	-0.1700	-0.2300	0.1700	0.5463
36	-0.3600	-0.1100	-0.0100	0.0200	0.1422
37	-0.6400	-0.1300	0.2300	0.3100	0.5755
38	-0.5100	-0.1500	-0.1600	-0.0700	0.3131
39	-0.6400	0.1000	0.1800	0.0800	0.4584
40	-0.6700	0.1200	-0.1200	0.2800	0.5561
41	-0.8100	0.2200	0.2000	0.0200	0.7449
42	-0.6900	-0.0100	0.0600	-0.1500	0.5023
43	-0.6300	-0.2900	-0.0300	0.0100	0.4820
44	-0.6800	-0.1500	0.0700	-0.2000	0.5298
Percentage					19.0070
total variance	32.2764	5.5052	3.0602	2.3559	43.20

TABLE 2: UNROTATED FACTOR MATRIX, SOUTHGATE

	1	2	3	4	h^2
1	-0.6800	-0.1500	-0.1700	-0.3300	0.6227
2	-0.5800	-0.4400	-0.0500	0.0200	0.5329
3	-0.6500	-0.1300	-0.1300	-0.1300	0.4732
4	-0.7400	0.0600	-0.0100	0.1200	0.5657
5	-0.5500	0.1000	0.0300	-0.1500	0.3359
6	-0.5600	-0.0900	0.2200	0.0100	0.3702
7	-0.7700	0.2100	-0.0700	-0.2000	0.6819
8	-0.6500	0.1800	-0.3100	-0.0600	0.5546
9	-0.7200	0.2400	-0.1600	0.2100	0.6457
10	0.2700	-0.0700	-0.3500	-0.1100	0.2124
11	-0.5500	-0.1800	0.1100	-0.1900	0.3831
12	-0.5100	-0.4100	-0.4100	0.1300	0.6132
13	-0.4800	0.1200	0.2900	0.2700	0.4018
14	-0.3300	0.0700	0.2100	0.0700	0.1628
15	-0.4200	-0.4200	-0.2900	-0.1300	0.4538
16	-0.5700	-0.0900	0.1600	0.0400	0.3602
17	-0.5900	-0.1200	0.3000	0.0500	0.4550
18	-0.7800	0.1800	0.0900	-0.0700	0.6538
19	-0.5900	-0.3800	-0.0500	0.1300	0.5119
20	-0.7500	0.2500	-0.2500	0.2900	0.7716
21	-0.6600	-0.0100	0.4300	-0.0600	0.6242
22	-0.6800	-0.2100	-0.1500	-0.1000	0.5390
23	-0.6000	0.1500	-0.0300	0.0100	0.3835
24	-0.7700	0.0500	0.1400	-0.2300	0.6679
25	-0.5900	-0.1900	0.2300	0.3000	0.5271
26	-0.6600	0.1100	-0.2800	0.3200	0.6285
27	-0.6700	-0.0500	0.2200	0.0200	0.5002
28	-0.7500	0.0900	0.2900	-0.2000	0.6947
29	-0.5700	-0.4000	0.0800	0.0900	0.4994
30	-0.7300	-0.0400	0.0400	-0.0600	0.5397
31	-0.7100	0.1700	-0.1000	-0.1700	0.5719
32	-0.5800	0.1400	-0.1000	0.2400	0.4236
33	-0.5400	0.1000	-0.1100	0.0100	0.3138
34	-0.7900	0.1400	-0.0400	-0.1800	0.6777
35	-0.2700	-0.3500	-0.3200	-0.1700	0.3267
36	-0.5200	-0.1200	0.2700	0.0600	0.3613
37	-0.3900	-0.2500	-0.3000	-0.2900	0.3887
38	-0.5900	-0.1200	-0.0800	-0.0400	0.3705
39	-0.7300	0.1800	-0.1200	0.1700	0.6086
40	-0.5100	-0.2400	0.0400	0.2700	0.3922
41	-0.6500	-0.1700	0.240	0.1300	0.5259
42	-0.6800	-0.1200	0.0100	0.0900	0.4850
43	-0.5900	-0.1100	0.2100	-0.0600	0.4079
44	-0.6300	0.2300	0.0100	-0.0700	0.4548
Percentage total variance	38.1555	4.2068	4.1625	2.7370	21.6752 49.26

TABLE 3: UNROTATED FACTOR MATRIX, WESTMOUNT AND SOUTHGATE

	1	2	3	4	h^2
1	-0.6300	-0.1100	-0.1400	-0.1800	0.4610
2	-0.5800	-0.3900	0.1100	-0.0400	0.5022
3	-0.6100	-0.1900	-0.0700	-0.0800	0.4195
4	-0.6700	0.2400	-0.0300	-0.1900	0.5435
5	-0.5000	0.0900	-0.0900	0.0100	0.2663
6	-0.6000	0.2100	0.1500	0.0300	0.4275
7	-0.6900	0.1300	-0.1700	-0.1000	0.5319
8	-0.5700	0.2000	-0.2700	-0.0200	0.4382
9	-0.5400	0.0100	-0.1100	0.1300	0.3207
10	0.2700	-0.2300	-0.1500	-0.1400	0.1679
11	-0.4700	-0.4600	0.0300	0.0500	0.4359
12	-0.4400	-0.4700	-0.0500	-0.1200	0.4314
13	-0.5200	0.1800	0.2900	0.1200	0.4013
14	-0.3400	0.1800	0.2200	-0.0700	0.2013
15	-0.4000	-0.4200	-0.0400	-0.3200	0.4404
16	-0.6100	-0.1100	0.0800	-0.0300	0.3915
17	-0.5700	0.0600	0.2400	-0.1700	0.4150
18	-0.7300	0.1500	0.0600	-0.0100	0.5591
19	-0.6500	-0.1200	0.1300	-0.1100	0.4659
20	-0.7100	0.2600	-0.1100	-0.1200	0.5982
21	-0.6300	0.2700	0.2600	-0.1000	0.5474
22	-0.6500	0.1700	-0.3000	-0.0400	0.5430
23	-0.5500	0.1800	-0.1800	-0.0100	0.3674
24	-0.6900	0.0400	0.0100	0.0300	0.4787
25	-0.6100	-0.1500	0.2000	-0.0300	0.4355
26	-0.6500	0.1800	-0.1400	0.0300	0.4754
27	-0.7100	0.2700	0.1800	-0.0700	0.6143
28	-0.7200	0.1400	0.1000	-0.0100	0.5481
29	-0.6400	-0.2100	0.1000	-0.1500	0.4862
30	-0.7400	-0.1800	0.1000	0.1700	0.6189
31	-0.7200	0.0100	-0.1700	0.1800	0.5798
32	-0.6600	0.1900	-0.2200	0.0200	0.5205
33	-0.5100	-0.1400	-0.1800	0.1800	0.3445
34	-0.7200	-0.0600	-0.0800	0.2000	0.5684
35	0.2400	-0.3700	-0.1500	-0.2900	0.3011
36	-0.6200	-0.0100	0.2000	0.1600	0.4501
37	-0.4400	-0.3000	-0.1500	-0.2100	0.3502
38	-0.5900	-0.2400	-0.0100	0.1100	0.4179
39	-0.7300	-0.1600	-0.1000	0.2100	0.6126
40	-0.5100	-0.3000	0.0900	0.2300	0.4111
41	-0.6800	-0.1200	0.2500	0.0200	0.5397
42	-0.6300	-0.2200	-0.0	0.1500	0.4678
43	-0.5700	0.2000	0.1100	-0.1400	0.3966
44	-0.6000	0.2400	-0.1300	0.0300	0.4354
Percentage					19.9293
total variance	36.0739	4.9855	2.4125	1.8220	45.29

TABLE 4: FACTOR LOADING MATRIX, WESTMOUNT

	C- 1	C- 2	C- 3	C- 4
R- 1	-0.065296	-0.276878	-0.251888	0.568686
R- 2	-0.301030	-0.545631	-0.022509	0.143350
R- 3	-0.210237	-0.373739	-0.230156	0.278419
R- 4	-0.494143	-0.198359	-0.321565	0.390407
R- 5	-0.299722	-0.130916	-0.381005	0.031441
R- 6	-0.388845	0.093752	-0.284039	0.572578
R- 7	-0.270649	-0.222351	-0.346993	0.501234
R- 8	-0.273226	0.023402	-0.459366	0.344756
R- 9	-0.320832	-0.077978	-0.242152	-0.047134
R- 10	0.262368	-0.225764	0.195997	-0.096630
R- 11	0.171591	-0.528692	-0.047358	0.258246
R- 12	-0.098418	-0.563260	0.007502	-0.103582
R- 13	-0.592795	0.057975	-0.085881	0.264534
R- 14	-0.528295	-0.086987	-0.036479	0.105483
R- 15	-0.112856	-0.646092	-0.035497	0.008661
R- 16	-0.304620	-0.436202	-0.225583	0.304163
R- 17	-0.526206	-0.205246	-0.159557	0.094522
R- 18	-0.518953	-0.167498	-0.232067	0.447469
R- 19	-0.388863	-0.258543	-0.223268	0.444496
R- 20	-0.646288	-0.199447	-0.361331	0.207351
R- 21	-0.666030	-0.033645	-0.248771	0.182501
R- 22	-0.326206	-0.142436	-0.666170	0.077190
R- 23	-0.271304	-0.013098	-0.545782	0.203648
R- 24	-0.515788	-0.211495	-0.292749	0.117252
R- 25	-0.366440	-0.399164	-0.178563	0.212328
R- 26	-0.426394	0.039883	-0.509631	0.273382
R- 27	-0.679444	-0.040240	-0.325491	0.416419
R- 28	-0.510608	-0.239569	-0.383272	0.208596
R- 29	-0.267779	-0.456493	-0.309829	0.322408
R- 30	-0.393228	-0.366690	-0.468588	0.164265
R- 31	-0.297365	-0.135170	-0.592356	0.336446
R- 32	-0.292814	-0.067182	-0.760240	0.278784
R- 33	0.071578	-0.131571	-0.471858	0.204127
R- 34	-0.262217	-0.184330	-0.401184	0.335750
R- 35	0.071917	-0.496115	-0.056650	0.021751
R- 36	-0.435543	-0.105668	-0.268573	0.385904
R- 37	-0.071803	-0.441209	-0.255996	0.248609
R- 38	-0.209752	-0.371124	-0.209239	0.224322
R- 39	-0.144904	-0.313384	-0.458084	0.465535
R- 40	-0.172134	-0.207350	-0.177442	0.195433
R- 41	-0.397997	-0.279975	-0.053931	0.578553
R- 42	-0.188170	-0.289894	-0.398032	0.194047
R- 43	-0.509363	-0.089817	-0.209925	0.389459
R- 44	-0.264584	-0.031189	-0.388234	0.585446

TABLE 5: FACTOR LOADING MATRIX, SOUTHGATE

	C- 1	C- 2	C- 3	C- 4
R- 1	-0.566061	-0.504603	0.191014	0.134362
R- 2	-0.129471	-0.584384	0.389772	0.157149
R- 3	-0.413999	-0.427793	0.254110	0.238785
R- 4	-0.367463	-0.215944	0.418670	0.464101
R- 5	-0.465256	-0.140042	0.260725	0.194541
R- 6	-0.266498	-0.180066	0.501230	0.142869
R- 7	-0.669325	-0.184684	0.267815	0.349011
R- 8	-0.503823	-0.258019	0.065701	0.481831
R- 9	-0.377177	-0.123989	0.267660	0.649678
R- 10	0.095646	-0.129829	-0.426966	-0.076334
R- 11	-0.358998	-0.328789	0.380769	0.023661
R- 12	-0.041687	-0.694186	0.096541	0.359268
R- 13	-0.123925	0.082948	0.521754	0.322109
R- 14	-0.159738	0.047319	0.339362	0.142586
R- 15	-0.160388	-0.642182	0.074972	0.086770
R- 16	-0.248300	-0.202917	0.468784	0.195562
R- 17	-0.235295	-0.172511	0.586868	0.134100
R- 18	-0.564160	-0.122987	0.431860	0.363406
R- 19	-0.081576	-0.521407	0.411420	0.249951
R- 20	-0.350648	-0.161684	0.227830	0.750721
R- 21	-0.395726	-0.062185	0.677049	0.080372
R- 22	-0.555457	-0.183295	0.179648	0.408273
R- 23	-0.398403	-0.125111	0.277506	0.366429
R- 24	-0.616102	-0.221517	0.450750	0.176728
R- 25	-0.032659	-0.219300	0.623703	0.294880
R- 26	-0.204788	-0.246678	0.205966	0.689780
R- 27	-0.341992	-0.183567	0.556381	0.216552
R- 28	-0.593311	-0.108361	0.563074	0.140848
R- 29	-0.083019	-0.483127	0.492275	0.147159
R- 30	-0.440463	-0.302077	0.424140	0.281679
R- 31	-0.602585	-0.206199	0.229128	0.345422
R- 32	-0.228096	-0.125114	0.277511	0.538500
R- 33	-0.354119	-0.183029	0.192034	0.349007
R- 34	-0.636710	-0.231224	0.319831	0.335404
R- 35	-0.131977	-0.552293	-0.050573	0.032478
R- 36	-0.188146	-0.151302	0.533974	0.126673
R- 37	-0.331880	-0.532899	-0.022146	0.040512
R- 38	-0.315313	-0.360044	0.284285	0.249321
R- 39	-0.376448	-0.162050	0.305018	0.586652
R- 40	0.010568	-0.325089	0.440999	0.312551
R- 41	-0.198020	-0.245975	0.620001	0.224060
R- 42	-0.270085	-0.330763	0.425636	0.341135
R- 43	-0.327372	-0.221639	0.496850	0.109848
R- 44	-0.508435	-0.057092	0.280671	0.347263

TABLE 6: FACTOR LOADING MATRIX, WESTMOUNT AND SOUTHGATE

	C- 1	C- 2	C- 3	C- 4
R- 1	-0.428370	-0.439124	0.225317	0.185249
R- 2	-0.097791	-0.505374	0.257259	0.409804
R- 3	-0.331559	-0.419925	0.224347	0.290402
R- 4	-0.536981	-0.206592	0.464666	0.047701
R- 5	-0.398026	-0.132171	0.237252	0.194627
R- 6	-0.345059	-0.049219	0.506118	0.214184
R- 7	-0.585422	-0.251587	0.314239	0.166121
R- 8	-0.615206	-0.114121	0.188706	0.134064
R- 9	-0.396716	-0.128413	0.191769	0.333621
R- 10	0.154813	-0.154936	-0.316186	-0.145238
R- 11	-0.061469	-0.466966	0.093860	0.456887
R- 12	-0.093810	-0.569083	0.045574	0.314128
R- 13	-0.191593	0.027001	0.541430	0.275592
R- 14	-0.137047	-0.030973	0.426196	0.044203
R- 15	-0.090006	-0.646043	0.091201	0.119384
R- 16	-0.267307	-0.313294	0.352523	0.310182
R- 17	-0.211202	-0.257942	0.531636	0.118657
R- 18	-0.464681	-0.176083	0.490164	0.263255
R- 19	-0.255711	-0.381541	0.424682	0.276390
R- 20	-0.613378	-0.177336	0.416041	0.103451
R- 21	-0.325399	-0.093462	0.648336	0.108669
R- 22	-0.662518	-0.177509	0.193195	0.155583
R- 23	-0.533018	-0.106330	0.237132	0.145845
R- 24	-0.418869	-0.218950	0.390092	0.318507
R- 25	-0.160963	-0.337512	0.424479	0.336157
R- 26	-0.558760	-0.117267	0.304990	0.224472
R- 27	-0.426894	-0.107328	0.626228	0.162960
R- 28	-0.426645	-0.176088	0.509809	0.268755
R- 29	-0.223022	-0.474208	0.370548	0.272562
R- 30	-0.342849	-0.300486	0.311682	0.553514
R- 31	-0.543631	-0.173000	0.238371	0.445995
R- 32	-0.623528	-0.130920	0.257245	0.209894
R- 33	-0.358081	-0.194325	0.058109	0.414339
R- 34	-0.449131	-0.199110	0.273068	0.493861
R- 35	-0.089696	-0.533853	-0.063126	0.034516
R- 36	-0.230197	-0.122228	0.446104	0.423002
R- 37	-0.240279	-0.516206	0.052577	0.163843
R- 38	-0.252360	-0.330134	0.200471	0.456689
R- 39	-0.425898	-0.266467	0.221468	0.550680
R- 40	-0.114703	-0.255371	0.188212	0.551980
R- 41	-0.191279	-0.302845	0.499133	0.397216
R- 42	-0.279599	-0.302780	0.232727	0.499227
R- 43	-0.359297	-0.159910	0.490026	0.070579
R- 44	-0.551511	-0.048601	0.309318	0.181688